MINISTÈRE DES COMMUNICATIONS

PROGRESS REPORT AND OUTLOOK

Information Technologies in the Québec Government 1987-1988

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Managing technologies: *a priority for decision makers*

The ministère des Communications has for 11 years published an annual report of the activities and costs related to the Québec government's use of data processing and information technologies.

During these years, there has been a significant development in the use, management and mastery of these technologies. Like all modern States, Québec has become dependent on these technologies for its day-to-day operation. For example, it would be unthinkable today to manage health insurance, social aid or the Courts without information processing. Over the past 10 years, despite major budget cuts, investment in technologies has been a government priority, and in many sectors they have been indispensable in meeting the demand for new government services and the ever present challenge of improving public services.

In government as elsewhere, one of the main themes of the 1990s will without a doubt be information management. In 1987-1988, government departments and agencies invested over half a billion dollars in information technologies, amounting to close to 7% of total operating expenses.

In these circumstances, management of these technologies would seem to be a matter of concern to all levels of decision making. Information processing is much too important to be left entirely in the hands of the computer experts. There must be constant communication between those who are directly responsible for managing the technologies and department and agency directors. **The funds devoted to information technologies must not be regarded merely as expenses, but rather as investments. The main challenge to decision makers, then, is to ensure that objectives are reached at the lowest possible cost.**

Managing technologies also means management of civil service employees, more and more of whom work constantly with computers and software. In Québec, these employees expect, and with good reason, to be able to work with tools that function in French. As you will see in Chapter 5, **the Québec government has greatly increased its efforts to improve this situation in the field of data processing.** But over and above such action, which is still somewhat modest, furthering this paramount cause throughout Québec requires the support of all social partners — employees, employers, unions, business firms and public administrations. **A concerted effort is necessary to spread the use of French in technology and it is the public administration's duty to lead the way.**

Technological management requires in addition the adoption of a normative framework with a view to consistency in development. **The convergence of the technologies of the telephone, data communications and data processing demands such a framework if we are to avoid major compatibility and interconnection problems.** This is a matter of equal concern to the manufacturers and public and private administrations. **The Québec government has made considerable progress in this regard over the past year by drawing up a document—the fruit of much thought on the part of the administration, bolstered by contributions from experts in the field—setting forth the guiding principles and technological orientations on which must be based the specific standards for ensuring efficient technological development.**

Finally, effective management of these technologies offers an additional challenge to government: support for the development of Québec firms working in the information technologies sector. The government has considerable purchasing power which, if properly used, can contribute to the development of a local industry capable of competing on the international market. **Just as major hydroelectric projects have helped the development of consulting engineering firms in Québec, so the government can team up with private enterprise in developing large-scale information processing projects. This can be achieved if business firms obtain complete mandates preferably centred on** advanced technologies. **The more successful our local industry the better the services they will offer.**

In conclusion, I want to stress the spirit of collaboration and the determination to act together manifested by all departments and agencies. Without this support the Québec government could not have attained its present mastery in the use of these technologies.

This teamwork and what it has achieved are a source of envy on the part of many governments and business firms. Maintaining such efforts will be our guarantee of scaling new heights in our pursuit of excellence.

Enjoy your reading!

Jacques Pigeon

Deputy Minister of Communications

This document constitutes the 11th report on information technologies published by the Québec government. Its production is the responsibility of the ministère des Communications, which coordinates information technology activities within the Québec government.

The public administration has been divided into two sectors for the purposes of this report, the public sector and the sector composed of agencies whose budgets are not voted by the National Assembly.

The **public sector** is made up of all the departments and certain agencies whose budgets are voted by the National Assembly. Agencies in this sector are called "agencies with approved budgets".

The **sector composed of agencies whose budgets are not approved** includes government corporations, boards and administrative commissions. The contribution of such agencies as the Régie des rentes du Québec and Hydro-Québec to the preparation of this report is a voluntary one, allowing the two sectors to be viewed side by side in order to obtain a total picture of data processing in the government administration.

The data in this report refer to the April 1, 1987 to March 31, 1988 fiscal year.

The list of departments and agencies that provided information for this 1987-1988 report appears in Table 6.1.

With constant improvement of the report in mind, we have considerably modified the contents of this year's document. It is oriented so as to give an overall view of technological activities and enable as many people as possible to follow developments in this sector.

Comments are welcome. They should be addressed to the Direction générale des technologies de l'information. The telephone number is (418) 643-8708.

Organization of information technology in the public sector

This chapter deals with the organization of information processing in the public sector, that is to say in the departments and agencies that have their budgets voted by the National Assembly. The process of setting up and regulating data processing activity in the public sector takes place at two levels, that of the departments and agencies and that of the four central administrations, the main responsibilities of which are described below.

Under the acts creating them, agencies with budgets that are not voted by the National Assembly are not necessarily subject to the same procedures, as they have their own special data processing set-up.

1.1 Departments and agencies with approved budgets

Each department and agency in the public sector is responsible for acquiring and managing its own data processing services. Some departments and agencies procure systems or data processing services from the government supplier, i.e. the Direction générale de l'informatique of the ministère des Communications; others go to the private sector. Departments and agencies that have their own processing centres are:

— ministère de l'Éducation;

— ministère de la Justice;

— ministère du Revenu;

— ministère de la Main-d'oeuvre et de la Sécurité du revenu;

— ministère de la Sécurité publique;

— Conseil du trésor and ministère des Finances.

1.2 Central administrations

When acquiring or developing data processing services, the departments and agencies in the public sector must deal with four administrations: the Conseil du trésor, the ministère des Approvisionnements et Services, the ministère de l'Industrie, du Commerce et de la Technologie and the ministère des Communications.

Conseil du trésor

The Conseil du trésor assures government coordination of information and information technologies on three levels.

First, with a view to furthering efficient government administration, it maintains and adapts for this domain a management framework defining the roles and responsibilities of the parties, as well as the administrative structures and mechanisms required.

It also promotes optimum use of information and information technologies within the government and rationalization of the required resources, by approving departmental and agency development plans and authorizing sizable investment projects.

Finally, it ensures respect for the government's objectives of transparency and fair treatment by imposing, or taking part in the establishing of, administrative rules for personnel management, acquisition of goods and services and financial management. It must also decide on the relevance of any derogation from these rules and sanction it if necessary.

Within the administration of the Conseil du trésor, it is mainly the Direction des politiques de gestion de l'information et des technologies de l'information that is responsible for providing the Conseil with the studies, analyses, opinions and recommendations about management matters under the Conseil's jurisdiction that enable it to make enlightened decisions.

Ministère des Approvisionnements et Services

The ministère des Approvisionnements et Services is responsible for drawing up and implementing policies on the acquisition and alienation of goods, including data processing hardware (computers, microcomputers, peripherals, etc.) and software, and for the actual acquisition and alienation of these goods.

The department provides the departments and agencies with a list of goods that conform to the government's technological orientations, for which qualified suppliers have been found. This list is produced jointly by the ministère des Approvisionnements et Services, the ministère des Communications and the ministère de l'Industrie, du Commerce et de la Technologie.

Another of the department's tasks is the preparation of a policy and a regulation on data processing service contracts that are awarded by the departments and agencies. To this end it manages, through the central bank of suppliers, the list of suppliers qualified to provide the government with information processing services.

It also has the responsibility of administering the Fonds renouvelable des équipements informatiques (FREI), whose purpose is to facilitate the acquisition, rational use and resale of major computer equipment in the Québec government.

Ministère de l'Industrie, du Commerce et de la Technologie

The ministère de l'Industrie, du Commerce et de la Technologie has a mandate to promote the development of Québec industry. The Direction des technologies de l'information acts on behalf of the department in the information technologies sector.

It monitors its development, defines orientations and promotes development possibilities for Québec. It also proposes government policies, measures and programs to stimulate expansion and consolidation in this sector.

The Direction administers the policy of economic partnership, the goal of which is to channel government outlays in the information technologies sector towards Québec or international business firms involved in developing the industry in Québec.

Ministère des Communications

The ministère des Communications acts in the fields of data processing and telecommunications through the information technologies, data processing and telecommunications branches.

The job of the Direction générale des technologies de l'information is to streamline the development of information processing within the government. It also tries to develop, within the government administration, expertise of the highest order in this field, and to make available to all departments and agencies with approved budgets data processing services commensurate with their real needs. Lastly, it participates in government efforts to develop the Québec information technologies industry, and must ensure that the effects of these technologies on Québec society are positive, technologically, socially and economically.

The Direction générale de l'informatique offers data processing services to the departments and agencies that do not have the resources necessary to meet their own needs in this domain. It provides them with processing and remote processing services, and gives them access to information systems and data banks. It also offers services for the development, maintenance and use of computerized systems, and has placed at their disposal a development centre and an information centre.

The Direction générale des télécommunications must furnish all the telecommunications services needed by departments and agencies with approved budgets. These services are also available to some 50 agencies whose budgets are not voted by the National Assembly. In addition, the branch gives specialized advice to departments and agencies which request it.

Since the beginning of 1988, two special funds have been created for the billing and self-financing of services dispensed by the Direction générale de l'informatique and the Direction générale des télécommunications.

CHAPTER 2

Information technologies in Québec society

What is the extent of the penetration and use of data processing in Québec society? To find the answer to this important question, the ministère des Communications carried out a large-scale study of everything that had been published on the subject—study reports, data banks, statistical compilations, monographs, surveys, reviews and government publications—and drew up a summary of this material. The following pages review the main points that emerged from this summary, which will be available at Les Publications du Québec in June 1989.

2.1 The business market

Currently, close to 80% of business firms use data processing.

In 1985, the private sector possessed data processing assets worth an estimated $914 million.

The two leaders in the market are IBM and Digital Equipment, with over half the market in computers installed in Québec business firms.

Information technologies are an integral part of the day-to-day operations of the majority of Québec business firms, close to 80% of which use data processing. More extensive study of the situation, however, shows that this proportion increases with the size of the firm. Only 60% of firms with fewer than 19 employees use data processing whereas all businesses with more than 500 employees are users.

In 1985, the data processing assets of the private sector were an estimated $914 million. Québec's computer base, not including microcomputers, rose from 204 installations in 1965 to over 2360 in 1986. Québec's share, amounting to 29% of Canada's computer base in 1965, has over the years gradually dropped to 16%. During the same period, Ontario's share remained stable, passing from 46% in 1965 to 45% in 1986.

The two market leaders, IBM and Digital Equipment, now possess over half (51%) of the installed computer market in Québec. IBM also dominates the microcomputer field with equipment in 40% of business firms, followed by Apple with 10% of the market. Ogivar products, which are made in Québec, are used by nearly 3% of firms.

Management and administration applications are found in 70% of the private firms that use data processing. Other applications are far behind: word processing (49% of firms), personnel management (43% of firms) and operations management (40% of firms).

What can be expected in the short term in the business market? Substantial progress in office automation in small and very small firms is anticipated. In large manufacturing companies, investments will be channelled principally towards computer-assisted design and manufacturing systems (CAD/CAM). In addition, there seems to be considerable interest in network connection among medium-sized and large firms in the tertiary sector which have already adopted several data processing applications.

2.2 The municipal market

Only 20% of municipalities used data processing in their day-to-day operations in 1987.

Of the 1511 municipalities in Québec, only 311 or 20% had their own data processing systems in 1987. The same year, about 25% of all Canadian municipalities were equipped with computers. As is the case with business firms, the rate of computerization increases with the size of the municipality: all municipalities with 25 000 inhabitants or more, 60% of municipalities with 5000 inhabitants or more and only 15% of those with fewer than 5000 inhabitants.

In 1987, Québec municipalities, including regional county municipalities and urban communities, devoted between 0.5% and 1.0% of their budgets to automatic data processing, an investment of close to $50 million. In the United States, municipal administrations allocated 1.4% to 1.8% of their annual budgets to computerization.

In 1987, Québec municipalities devoted between 0.5% and 1.0% of their budgets to automatic data processing, representing investments of nearly $50 million.

The development of data processing in municipalities is rather slow. The direct and indirect costs of processing hardware and the lack of interest on the part of the authorities seem to be the main obstacles to the computerization of municipalities.

To date, applications involving financial services, particularly taxation and accounting procedures, are the most highly developed.

In the short term, no great strides are anticipated. For the medium term, some experts think that geographic information systems will take hold in the municipalities and provide the impetus for more extensive computerization of municipal administrations.

2.3 The health market

The data processing market in the health sector is worth an estimated $100 million.

In Québec, health care cost close to $10 billion in 1987-1988. According to some experts, health establishments devote about 1% of their operating budgets to data processing, which represents a market of about $100 million.

The health market is very uneven and varies with the type of establishment. In the hospital sector, nearly two-thirds of the establishments had their own data processing facilities in 1987. There were 55 computers (microcomputers excluded) in 181 Québec hospitals, used mainly for administrative applications such as payroll and accounting.

Almost 84% of CLSCs own data processing equipment while only 25% of reception centres are computerized.

In the CLSC network, there are data processing facilities in close to 84% of the establishments. On the other hand, only 25% of reception centres have such equipment.

The hospital market is without a doubt the most promising for the future. A large part of this market involves medical administration applications, especially in the data processing sector of clinical operations, including management of the records of beneficiaries and management of therapeutic and diagnostic services.

A pilot project is under way —the Sidoci project—to study the feasibility and relevance of massive investments in computerizing the hospital records of beneficiaries. If the project proves promising, this approach could lead in the medium term to the installation of one terminal per bed, thereby opening the way to very large investments in the health sector.

2.4 The education market

Québec's school boards have a total of 28 500 microcomputers for educational purposes, one for every 32 students. The ratio in Ontario is one for every 20 students. The budget for microcomputers in schools is $18.50 per student in Québec compared with $27 per student in Ontario.

In the fall of 1987, almost 95% of Québec's public schools possessed at least one computer. There were 28 500 microcomputers being used for educational purposes in school boards, which means one computer for every 32 students. At that time Ontario schools had one computer for every 20 students.

The ministère de l'Éducation allocated a budget of $19.1 million for microcomputers in schools in the 1988-1989 fiscal year, which works out to $18.50 per student. In Ontario, for the same year the government allocated $47.8 million to the purchase of microcomputers for the schools, which means $27 per student.

There are over 100 different makes of microcomputer in Québec schools, but IBM and IBM-compatible equipment dominates the market with over 62% of the installations. In this group, there are more Comterm machines (close to 8 800) than any other model. Second comes the IBM PC (about 5 800). About 6 000 Apple microcomputers are to be found in Québec schools.

The great innovation of 1988 is the setting up of the Centres d'enrichissement en micro-informatique (CEMI). The department and the school boards will invest close to $3 million in some 30 CEMI, which are defined as "centres of evaluation, experimentation and training in microcomputing in schools".

2.5 The household market

Only 14% of Québec households had a microcomputer in 1987. The firm Commodore dominates this market with 28% of the installations, followed by Apple with 17%.

The most recent statistics show that the domestic data processing market is late in developing. Only 14% of Québec households had a microcomputer in 1987.

This phenomenon is not limited to Québec, for the rate in the whole of Canada is 14% and in Ontario, 15%.

There are several reasons for this slow development of domestic data processing. Among the most important are the high cost of equipment and lack of interest on the part of consumers. Early in the 1980s, the manufacturers made a strong pitch to capture this market, offering expensive computers with little to commend them. There was also a lack of good software, another factor in the disillusionment of many buyers who had been enthusiastic to begin with.

Despite everything, domestic information processing found an outlet in computer games. In 1987, this type of activity was responsible for 60% of microcomputer use time. In this castle Commodore is king; in 1987, it dominated the domestic market in Québec with 28% of the installations, followed by Apple with 17%.

Since 1987, the domestic market has found its second wind. White-collar workers and professionals who have learned to use the microcomputer at the office want to continue to use it at home. There are also the musicians, the free-lancers, the writers and other professionals who have their offices in their homes and who have become addicted to microprocessing. An estimated 130 000 microcomputers were bought by Québec households in 1988, representing a market of $260 million.

In the years to come, two factors will have an important effect on the development of domestic data processing: the advent of consumer data communications and the increasing popularity of portable computers, which means that the personal computer can be taken from the office to the home.

CHAPTER 3

Information technologies in the Québec government

The pages that follow give a general picture of the funds devoted to data processing in the past year and analyse briefly the main results of these investments. The use of information technologies has become imperative to the government's mandate and administration. The statistics given in this chapter confirm the priority accorded by the government to these technologies in order to improve public services and government efficiency.

In 1987-1988, $521.4 million were invested in information technologies, an increase of 4.7% ($23.3 million) over the preceding year.

Québec devotes $41 per inhabitant to data processing, which is about the national average.

Computerization of the public administration has been very rapid in the past five years. In 1987-1988, the number of employees per computerized work station was 1.8 in agencies with budgets not approved by the National Assembly and 3.5 in the public sector.

3.1 Overall picture

In 1987-1988, government departments and agencies spent $521.4 million on information technologies, a 4.7% ($23.3 million) increase over the previous year. This increase is slightly less than that for 1986-1987 (5.1%) and much less than in 1985-1986 (9.1%). For some years the government has been deliberately putting a brake on the growth of data processing expenditures with a view to placing more emphasis on the benefits obtained from investments.

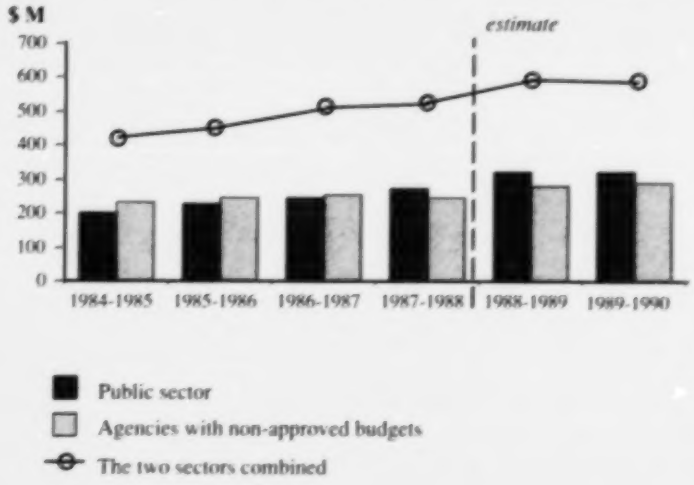
The growth rate of the Québec government's information processing expenditures for the period 1983 to 1988 was 15.4%, very similar to Ontario's rate of 14.8% for the same period. On the other hand, Ontario invested only $29 per inhabitant against Québec's $41 and the federal government's $43. Alberta is the leader with $60 per inhabitant.

Over the past five years, computerization in the public administration has increased rapidly. The most revealing indication of this phenomenon is the employee rate per work station, which rose from 13.6 on March 31, 1983 to 3.5 on March 31, 1988 in departments and agencies with approved budgets.

The level was even higher in agencies with budgets not voted by the National Assembly, i.e. 1.8 on March 31, 1988.

Figure 3.1

Evolution of data processing costs in the public sector, in agencies with non-approved budgets and in the two sectors combined, 1984 to 1990



3.2 Total information processing costs

Figure 3.1 shows the comparative change in data processing costs in the public sector and in agencies with non-approved budgets.

We shall first analyse the evolution of costs in agencies with non-approved budgets. In 1987-1988, there was a drop of $7 million, or 2.8%, in information processing costs. There are three main reasons for this decrease.

First, the Régie de l'assurance-maladie du Québec invested $5 million less in data processing. This agency encourages health professionals to use computerized billing, which cuts the costs of data entry and delays in payment considerably.

Second, Loto-Québec reported a $4.4 million decrease in costs for 1987-1988, the result of a long strike. In addition, hardware costs dropped substantially, for there were no amortization expenses for a large part of its equipment, the acquisition of which largely dates backs more than five years.

Third, data from Sidbec were not included in the total data from agencies with non-approved budgets because of the nature of its operations. Last year, Sidbec reported data processing expenditures of $4.3 million.

In the public sector we have a different picture. There was a $30.4 million increase in data processing expenditures, which reached $274.1 million in 1987-1988. This is a rise of 12.4%, or more than double that of the preceding year (6.1%).

In 1987-1988, agencies with non-approved budgets experienced a drop of 2.8% in data processing costs.

For the first time, public sector costs exceeded those of the agencies with non-approved budgets.

Some of the factors underlying this rise in costs are:

- the addition of data from four departments and agencies to this year's data processing report: National Assembly, Conseil exécutif, ministère du Commerce extérieur and Office de planification et de développement du Québec (OPDQ). This addition results in a rise of $5.1 million for the public sector;
- the resumption of the important systems redesign work at the ministère du Revenu and the beginning of systems redesign at the ministère de la Main-d'oeuvre et de la Sécurité du revenu, generating an increase of $9.9 million;
- the appreciable rise in investments in information technologies by the ministère des Transports (+$5.4 million) and the ministère du Loisir, de la Chasse et de la Pêche (+$2.6 million).

Figure 3.2

Breakdown of public sector data processing costs by type of service in 1983-1984

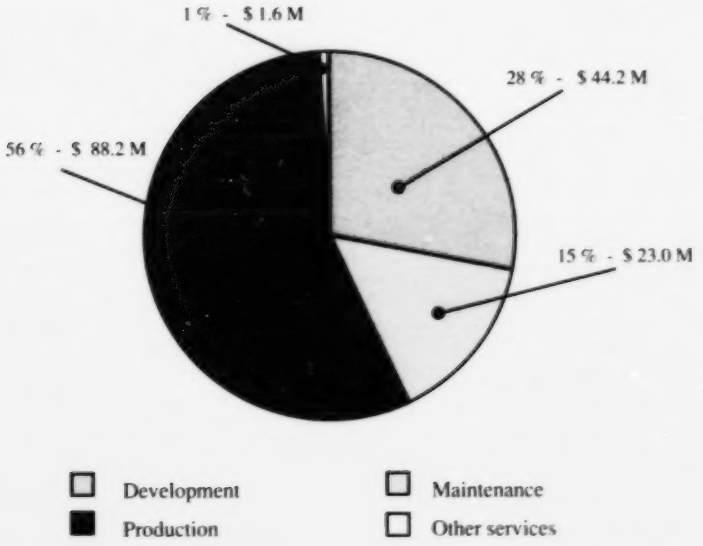
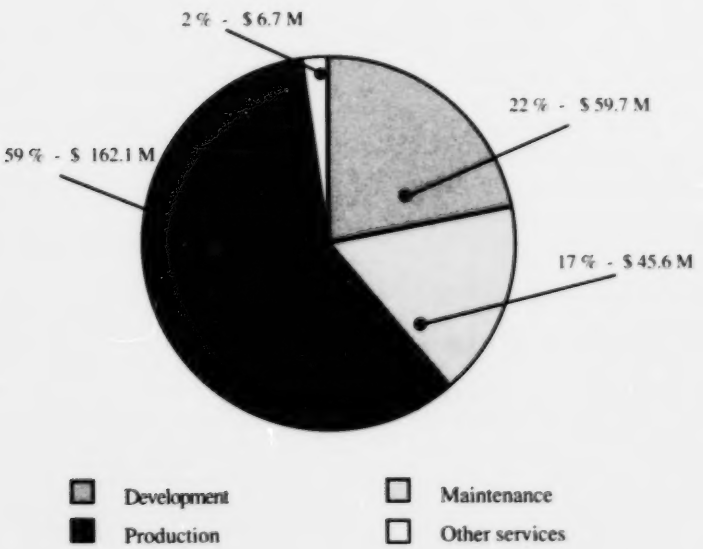


Figure 3.3

Breakdown of public sector data processing costs by type of service in 1987-1988



3.3 Breakdown of costs by type of service

Figures 3.2 and 3.3 show the evolution of government data processing costs for the past five years, broken down by type of service, i.e. development, maintenance, production and others.

We shall look first at development costs. Over a period of four years, the costs of setting up new systems rose 7.8% a year, from $44.2 million in 1983-1984 to $59.7 million in 1987-1988. The reasons are not far to seek. The departments and agencies have an increasing need for new systems to improve government effectiveness and the quality of services. Despite this considerable increase, the cost of development services in relation to other types of services dropped from 28% in 1983-1984 to 22% in 1987-1988.

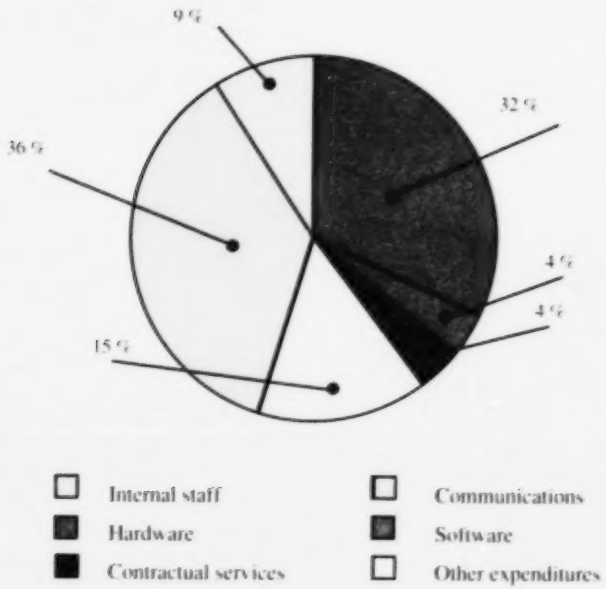
Production costs jumped by $73.9 million in four years, an increase of 16.4% a year. Maintenance costs almost doubled in this period, rising from $23 million in 1983-1984 to $45.6 million in 1987-1988, an annual increase of 18.6%.

To give a simple illustration of this breakdown, it can be said that for every dollar invested in data processing 22¢ go to developing new systems and the rest goes almost entirely to maintaining and exploiting existing systems.

The costs of upkeep and production have increased more quickly than those for development, for the investment in new systems generates recurring maintenance and production expenses that add to the existing costs.

Figure 3.4

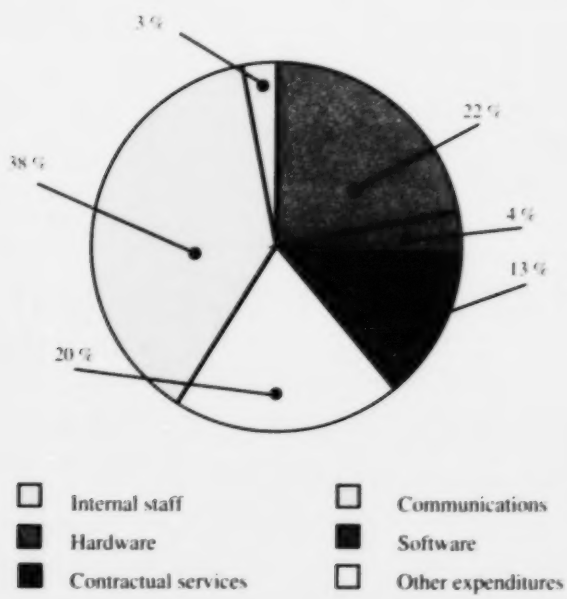
Breakdown of data processing costs in the United States by type of expenditure in 1987-1988



Source: ***Information Systems Technology in State Government; 1987-1988 Annual Report***, NASIS, Lexington, USA, p. 41

Figure 3.5

Breakdown of data processing costs in the Québec government by type of expenditure in 1987-1988



3.4 Breakdown of costs by type of resource

An analysis of data processing costs according to the type of resource provides a more specific explanation of the factors that have had an impact on the evolution of these costs. Before each of the resources is analysed in more detail, an interesting comparison can be made between the allocation of data processing resources in the Québec government and in the United States. Figures 3.4 and 3.5 illustrate the government's determination to promote the development of expertise in Québec business firms. In fact, all things considered, the Québec government spends three times more than the United States for contractual services (13% compared to 4%). However, the United States spends 10% more than Québec on hardware and 6% more on data communications.

3.4.1 Human resources

Internal staff

Of all the resources invested in information technologies, the cost of personnel is the largest expenditure in data processing. In 1987-1988, government departments and agencies devoted $196 million to internal staff (permanent and casual) assigned to duties or tasks related to data processing. This amount is 38% of the total data processing costs of the Québec government.

Since the relative weight of expenditures for human resources is considerable compared to all data processing expenditures, a significant variation in this category of expenditure has a substantial impact on the evolution of all costs.

This phenomenon is particularly apparent in 1987-1988 if the evolution of costs in the public sector and that of agencies whose budgets are not approved by the National Assembly are examined separately.

Figure 3.6

Breakdown of the rise in expenditures in the public sector in 1987-1988

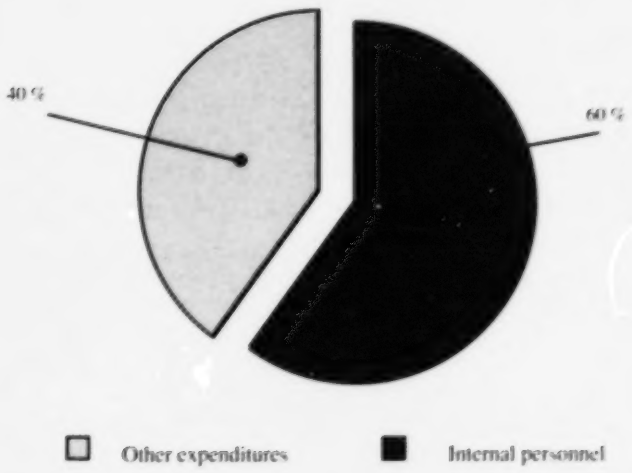
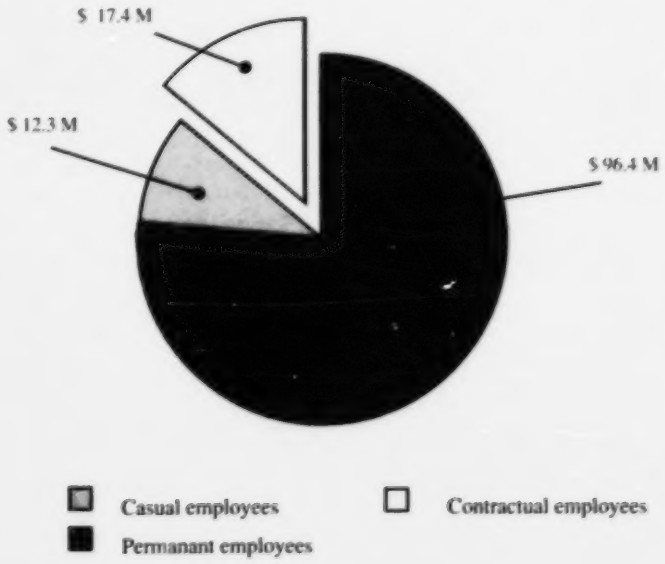


Figure 3.7

Breakdown of the cost of human resources for data processing in the public sector by category of personnel in 1987-1988



In the public sector, the cost of internal staff (including fringe benefits) rose by 20.1% from $90.5 million in 1986-1987 to $108.7 million in 1987-1988, an increase of $18.2 million. This amount represents 60% of the total increase in costs in the public sector, as shown in Figure 3.6.

The increase is attributable, on the one hand, to the 11.1% rise in the number of person-years worked by internal staff and, on the other, to the normal increase in wage scales and the greater "professionalization" of permanent staff (a larger number of analysts in 1987-1988). Staff increased mainly at the ministère du Revenu and the ministère de la Main-d'oeuvre et de la Sécurité du revenu, where major systems redesign projects were begun.

In contrast to what has occurred in the public sector, expenditures for personnel (including fringe benefits) at agencies whose budgets are not approved by the National Assembly declined by $3.3 million in 1987-1988. This reduction is attributable to a 10% decrease in the number of person-years worked by permanent staff in this sector. Two agencies were mainly responsible for the decline: Loto-Québec and the Régie de l'assurance-maladie du Québec.

Contractual services in the public sector

Private enterprise is still a major supplier of the Québec government. In 1987-1988, nearly $32 million (11.7% of all expenditures in the public sector) was devoted to procuring contractual, professional or technical services in the public sector. The year before, a very similar amount—$31.5 million—was allocated to this category of expenditure.

Of the $32 million, an estimated $14.6 million was spent to procure contractual processing services and an estimated $17.4 million was spent for professional services (manpower). The latter amount represents 14% of all costs for data processing staff in the public sector in 1987-1988.

Figure 3.8

Evolution of hardware costs in the Québec government from 1984-1985 to 1987-1988

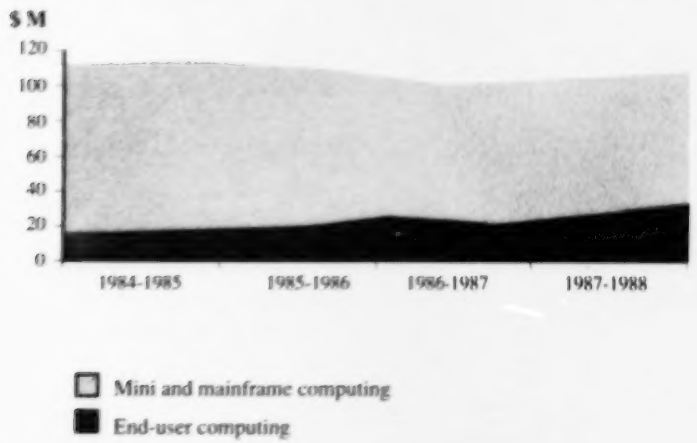
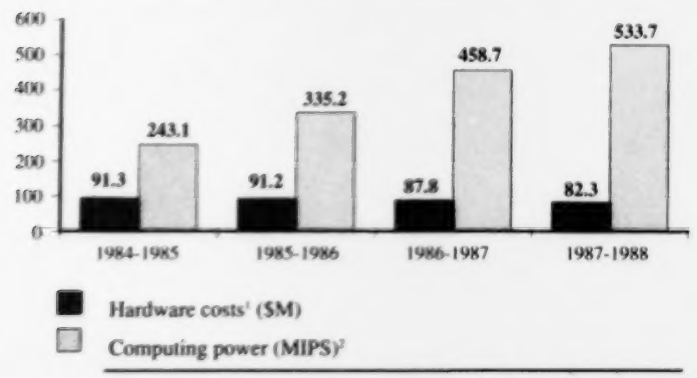


Figure 3.9

Evolution of the computing power of large computers and hardware costs[1] in the Québec government from 1984-1985 to 1987-1988



1 Include mini and mainframe processing, but exclude end-user computing.

2 Millions of instructions per second.

It is significant that, for the first time, in 1987-1988 there was a decrease—of 9.4%—in the cost of professional services. The reduction is explained in part by a temporary imbalance of supply and demand, which caused a reduction in rates. However, the estimates issued by the departments forecast a substantial increase in recourse to external professional services in the coming years.

3.4.2 Technological resources

Technological resources are the second main category of data processing expenditures in the Québec government. They include leased or purchased data processing hardware, leased or purchased software and telecommunications costs.

Data processing hardware

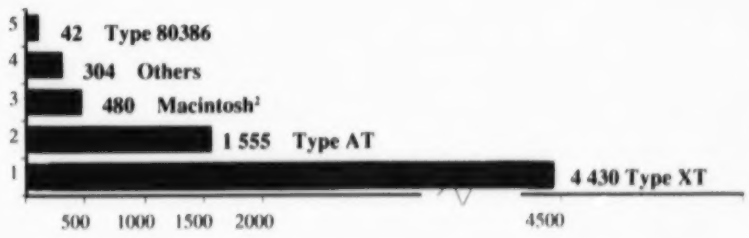
The largest expenditure for technological resources is still for hardware. In 1987-1988, a total of $114.9 million, or only 3.9% more than the previous year ($110.6 million) and 6% more than in 1984-1985 ($108.3 million), was invested in hardware. The category has therefore varied little in three years.

Figure 3.8 illustrates the evolution of hardware costs since 1984-1985. Expenditures are shown in superimposed layers, highlighting the significant growth of end-user computing costs and the stabilization of costs related to mainframe and mini computers. In 1984-1985, $17 million was spent on end-user computing and $91.3 million on mini and mainframe-based computing. Three years later, in 1987-1988, end-user computing costs almost doubled to $32.6 million and costs for mini and mainframe computing decreased to $82.3 million.

Two factors may explain the reduction in the cost of mini and mainframe computing. First, technology has made giant strides over the past few years. For the same cost, the consumer has access to much higher performance units. Figure 3.9 clearly illustrates this trend.

Figure 3.10

Breakdown of the microcomputer base[1] in the Québec government by type of technology, as at March 31, 1988



1 Hydro-Québec's microcomputers are not included.

2 Including 225 at the Régie des rentes du Québec and 100 at Loto-Québec.

Figure 3.11

Evolution of hardware and software costs in the Québec government from 1984-1985 to 1987-1988

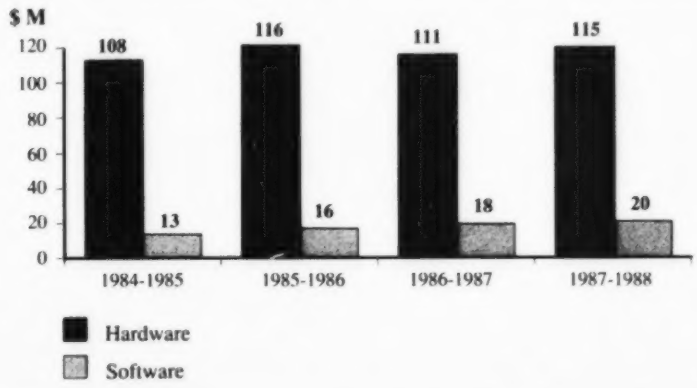
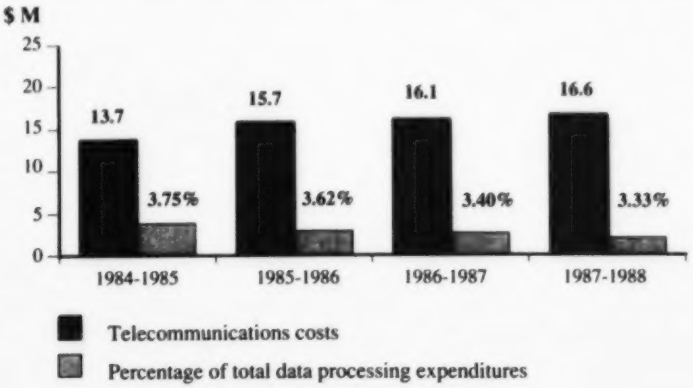


Figure 3.12

Evolution of telecommunications costs from 1984-1985 to 1987-1988



Since 1984-1985, computing power has more than doubled whereas costs have decreased slightly. A similar phenomenon is observed in regard to storage capacity, which increased from 693 to 1 600 gigabytes during the same period.

Second, the contribution of the Fonds renouvelable pour les équipements informatiques (FREI), created in 1983 to facilitate the acquisition, rational use and resale of the government's major data processing hardware, must be considered. FREI's intervention also made it possible to prolong the life of units by ensuring their mobility between departments and agencies and to obtain better prices from government suppliers.

The substantial growth in office automation expenditures is explained by the purchase of microcomputers to gradually replace word processors and Type 3270 terminals. Figure 10 shows the breakdown of the microcomputer base according to type of technology. Type XT microcomputers are more numerous, but Type AT computers are becoming increasingly popular with government users.

Software

In 1987-1988, Québec government departments and agencies spent $19.6 million to acquire or lease software, or nearly 18% of the amount invested in hardware (see Figure 3.11). In contrast to hardware costs, which have stabilized, software costs have been growing at a rate of about 10% for two years and, according to the estimates provided by the departments and agencies, they may grow by 25% in 1988-1989, for a total of $24.6 million.

Telecommunications

Figure 3.12 illustrates the evolution of telecommunications costs since 1984-1985. What is striking at first glance is the levelling off of these costs at around $16 million since 1985-1986. Nonetheless, the demand for telecommunications services continues to grow. This is another area that is benefiting from technological improvements that enhance the performance of transmission links. Among the recently profitable initatives is the installation of a high-speed link between Québec City and Montréal, which enables users to share

an infrastructure and appreciably reduce their link leasing expenses. This link has made it possible to combine the individual circuits of 26 departments and to generate an estimated savings of $0.8 million to date.

3.5 Data processing security

The year 1987-1988 was a profitable one from the standpoint of data processing security. Much cooperation and planning went into ensuring the effectiveness of future intervention.

The ministère des Communications set up an interdepartmental task force that carried out several mandates during the year. It draw up a profile of the situation, reviewed strategies, proposed a policy and revised Standard NIGQ-02.

The task force recommended that a permanent structure be set up to continue the process of standardizing data processing security in the Québec government. The recommendation was approved and a standardization committee was created.

The committee has drawn up its work plan for the coming year. It consists in specifying standards for microcomputing, security integrated into systems development, telecommunications and physical plants.

With regard to back-up for essential systems, the ministère des Communications is developing a solution for government data processing centres that will provide broader and more effective back-up. Several departments will need a transition period to prepare for more extensive tests with new back-up installations. Furthermore, a framework program will be devised in 1988-1989 to provide the departments and agencies with support in their efforts to make staff more aware of data processing security.

CHAPTER 4

Benefits of data processing

For some few years, the Québec government has shown great transparency in publishing its expenditures. The data collection system set up over the last few years in the departments and agencies has made it possible to provide a faithful picture of data processing costs in the public administration.

The investments and efforts devoted to data processing are directly linked to the organizations' mandates and programs, and their achievement of strategic objectives. Whereas, in the beginning, data processing enabled universal programs to be set up and the government apparatus to be managed horizontally, today its use makes it possible for government programs to be tailored to special situations and better equity to be achieved from the standpoint of rights, as well as from that of citizens' obligations, and at the lowest possible cost. The new technology is used and will be used to support decision makers in their analysis of the feasibility and effectiveness of programs.

For the past two years, there has been marked interest on the part of central agencies and directors of departments and agencies in measuring the profitability of past and future data processing investments. The ministère des Communications is preparing a method of identifying the benefits derived from past investments, which will be incorporated into the departments' and agencies' annual data collection process. Moreover, an interdepartmental task force coordinated by the ministère des Communications will be created to establish a standardized method for evaluating the future profitability of data processing projects.

The benefits of the investments made in information technologies in a number of government departments and agencies are discussed in the following pages.

4.1 National Assembly

In the coming years, the National Assembly intends to continue to implement a number of technological means that will, among other things, have a direct impact on the management of the legislative process and parliamentary procedures. Investments are mainly planned for:

- the translation of bills;
- the layout of bills;
- communication activities;
- office work in the administrative as well as the parliamentary sector.

These investments will provide the Members of the National Assembly and their staffs with information that is better adapted to legislative work.

The preliminary studies carried out by the National Assembly show that the annual benefits it will derive from use of the technologies will exceed costs by the 4th year and that a full return on investment will be achieved after 7.7 years. Recurring benefits of some $400 000 a year will then be generated.

4.2 Commission administrative des régimes de retraite et d'assurances

The Commission administrative des régimes de retraite et d'assurances (CARRA) must administer all the pension and insurance plans entrusted to it by the government or devolving upon it through legislation, and acts as an advisory body in fringe benefit matters.

Since 1985, CARRA has had to face a marked increase in its workload following the adoption of various statutes. For example, in 1987-1988, it had to process 2000 additional pension applications and 5000 additional pension estimate inquiries. In the same year, 80 000 beneficiaries of various plans were added, an increase of 21%. Lastly, CARRA processed 4200 additional redemption applications, the number of which increases year after year.

Through data processing, CARRA has been able to handle this additional workload, despite a 7% reduction in staff. The rise in productivity of some 16% in five years is attributable to three factors:

(1) investments of $2.2 million to purchase and maintain office automation hardware and for user services;

(2) investments of $2.5 million to modernize data processing systems;

(3) the revision of work methods and techniques.

Moreover, according to a survey that evaluated the benefits derived from end-user computing, net benefits totalled $173 000 from 1983-1984 to 1987-1988. The survey estimated that there would be $652 000 in net benefits for the year 1988-1989.

4.3 Ministère de l'Éducation

The ministère de l'Éducation feels that, over the last few years, it has derived considerable benefits from its data processing investments in the ICARE, TICC and SÉSAME systems.

The ICARE system makes it possible to adequately evaluate the years of schooling of all teachers in Québec, regardless of where they attended school. From a financial viewpoint, the system has reduced the workload by eight person-years, which represents a savings of $400 000. ICARE also made it possible to recover excess payments estimated at $2.2 million for the year 1980-1981 alone and helped to provide better control in subsequent years. The annual costs of the system are an estimated $300 000, which is low compared to the benefits derived.

ICARE offers more than financial benefits. It has, in particular, reduced processing time from six months to 15 days and improved customer service.

TICC is a system that processes registrations for correspondence courses. It processes the student's file, from registration to the attestation of studies, helps manage teaching materials, and revenue and expenditures, and ensures pedagogical follow-up and the distribution and correction of homework. With the installation of TICC, a greater demand for correspondence courses could be handled while limiting the increase in personnel assigned to the program. Gains in staff productivity generated by TICC are some $1.5 million annually. The system has also reduced application processing time from seven weeks to twelve days. Estimated annual system costs are $300 000, the same as for ICARE.

Lastly, SÉSAME is a system that meets the needs generated by the establishment of a new pedagogical system in 1982. While reducing the number of officers assigned to the certification of secondary studies, SÉSAME has made it possible to process 3 000 000 school scores, publish 400 000 transcripts of marks and issue 80 000 diplomas each year. SÉSAME was essential to the achievement of the objectives set as part of the educational reform.

4.4 Ministère de la Main-d'oeuvre et de la Sécurité du revenu

At the ministère de la Main-d'oeuvre et de la Sécurité du revenu (MMSR), data processing has helped administer some 10 departmental social aid, employability development, and vocational qualification and training programs.

The social aid program alone affects 600 000 people, for whom benefits of $2.2 billion were paid in 1987-1988. It would be impossible to meet the requirements of these programs without computerized systems.

With a constant concern for improvement, the MMSR decided to revise the financial assistance and employability systems to minimize administration costs while favouring achievement of the objectives of the programs. Moreover, new systems will make it possible to produce a single file for each individual, and consultation on the screen by officers will greatly facilitate follow-up of the files.

The revision began in 1987-1988. It is estimated that it will require an investment of $35 million. In its 4th year, the benefits derived will equal the investment made. The MMSR anticipates that, in subsequent years, the new systems will generate annual benefits of more than $41 million, mainly through better means of tracking down excess payments.

Lastly, the revision will result in better quality services for Quebecers, mainly by improving the availability and the quality of information about their benefits.

4.5 Ministère de la Santé et des Services sociaux

The ministère de la Santé et des Services sociaux (MSSS) is in charge of the Québec socio-sanitary system (CRSSSs, hospitals, CSSs, CLSCs and so on). Its role consists in planning, programming, controlling and evaluating the health care system, making computerized systems essential, given the large masses of data to be processed.

The MSSS has large computerized systems that generate substantial benefits: support systems for data about negotiations with network staff and health professionals, and a system for data about services given the clienteles of short-term care hospitals.

The support systems for data about negotiations provide basic information for negotiations with management and health professionals, and the some 250 000 unionized employees of the health network. They make it possible to dispose of detailed, live data, to apply complex mathematical algorithms and to carry out simulations and comparisons. The contribution made by these systems is substantial from a strategic viewpoint since the amounts involved represent 80% of the network's annual budget, or some $10 billion.

Furthermore, through the MED-ÉCHO data bank (which contains data on the clientele of short-term care hospital centres), a comparative study of the state and evolution of stays in hospital since 1980 in establishments and regions throughout Québec has been made. Regional and program adjustments can thereby be made on the basis of reliable, objective data. These data are also of primary importance in preparing plans for the future.

In practical terms, the CRSSS in region 07 used the MED-ÉCHO data base advantageously to examine in more detail the situation of beneficiaries in the Outaouais region who received health services in Ontario. It was thereby noted that beneficiaries went to Ontario because of a lack of certain types of services in that region of Québec, although hospital stays are, on average, more expensive in Ontario than in Québec. After this analysis, it was decided to build a hospital in Gatineau and to recruit medical specialists. It is difficult to quantify the value to Quebecers of their obtaining services in their own locality and their own language. It is, however, possible to affirm unequivocably that, through this initiative, substantial savings were achieved in health costs billed by the neighbouring province. The bill has remained at nearly $50 million since 1982-1983. Without the new hospital, it would have totalled $70 million in 1987-1988 for a constant number of hospital stays.

4.6 Ministère du Revenu

Data processing is used at the ministère du Revenu to administer laws whose application is entrusted to the department from a perspective of service to the State and Quebecers in an equitable and efficient manner.

Thanks to data processing and development of the 1987 version of the TP-1 system, this department was able to achieve the objective set by the ministère des Finances to refund $173 million to taxpayers by March 31, 1988. The improvements made in SINTAX, an integrated tax management system, will make it possible to reduce by 11 person-years the staff assigned to this task and to reassign employees to collection duties. It is estimated that this will generate additional annual gains of some $2.7 million.

Other developments and improvements have also generated considerable benefits: the recovery of four person-years through the development of the CARDEX DES FAILLITES system, which illustrates the evolution of bankruptcy files, proposals for bankruptcy arrangements and volontary dissolutions; the development of the RADIATION system, which enables the department to automatically cancel unrecoverable accounts receivable, and the government to provide the actual figures for recoverable amounts in its financial statements; the development of office automation, which makes it possible to recover an estimated $600 000 more per year by monitoring petroleum company reports and

by exchanging information with the federal government, and an estimated $500 000 by eliminating manual calculations in the special investigations sector.

The ministère du Revenu is carrying out a major revision of these administrative systems, which should generate sizable benefits for the government. Among the developments achieved or under way is a system costing $327 000 to reconcile interest statements with tax returns, which generated additional revenue of nearly $5 million in 1987-1988 and will generate an estimated $10 million in 1988-1989. The mechanization of certain collection activities, which will allow 25 employees to be reassigned to the collection of outstanding accounts, should also be mentioned. This operation will accelerate fiscal receipts of about $12 million a year, in addition to reducing the risk of loss on doubtful accounts.

4.7 Ministère de la Justice

The ministère de la Justice, which is the custodian of all notarized acts, must ensure that they are preserved and accessible. From this perspective, it intends to invest nearly $31 million to computerize registry offices throughout Québec. This project will make it possible, in particular, to record on tape the documents preserved in registry offices.

According to estimates by the ministère de la Justice, seven years after the new systems are set up, the project will yield net benefits of approximately $4 million. Net benefits will accumulate in subsequent years and will total $16 million in the 10th year of the project.

Computerization of the management of civil cases is another important project, in which the department intends to invest nearly $18 million and which will generate an equal amount of financial benefits. Among the intangible benefits anticipated are increased user satisfaction, simplification of the "Preparation of Merit Rolls", better service to magistrates, clerks and the public, as well as better access by the clientele to available data.

CHAPTER 5

Major government concerns

The preceding chapters highlighted the increasing importance of information technologies in all of society's spheres of activity, including the public administration. However, proper management of the penetration of these technologies and their impact raises great concerns. The following pages very briefly underline the main domains of intervention on which the attention of government authorities is focused.

5.1 Research

The Québec government encourages and supports research initiatives that involve the cooperation of private enterprise, universities and government

At the Québec technology summit, held in the fall of 1988, several speakers pointed out the need for greater accessibility of private institutions and universities, as well as government institutions so that essential cooperation continues among all the social partners with a view to economic growth and technological development.

The Québec government strongly encourages this cooperation and has taken a number of steps to ensure it. Among the most important is its participation in the establishment in the mid-1980s of the Centre de recherche informatique de Montréal (CRIM) and, in 1985, of the Centre de recherche sur les applications pédagogiques de l'ordinateur (APO-QUÉBEC). Since 1986, it has also followed with interest the activities of the Groupe interuniversitaire de recherche en informatique cognitive des organisations (GIRICO). More recently, it has become involved in the creation of the Centre francophone de recherche en informatisation des organisations (CEFRIO).

CEFRIO is an agency that was founded in January 1987 through a grant under the Canada-Québec Subsidiary Agreement, a regional development accord managed jointly by the Canadian and Québec departments of communications. CEFRIO's mandate is to carry out research and development in the computerization of organizations. More specifically, the centre focuses on four main areas of research:

- the individual, organizational and social impact of computerization;
- appropriate computerization management methods;
- the linguistic and cultural dimensions of computerization;
- cognitive data processing by organizations.

Furthermore, pursuing the same objective of eliciting collaboration in research projects, the Québec government supports the federal government's initiative of investing $240 million over a four-year period to create centres of excellence. The objectives pursued in this program consist in promoting the development of long-term advanced applied research by the most competent researchers in the country in a national research network. These centres are to carry out projects with people from across Canada in conjunction with universities, industry and government.

The Québec government's contribution includes $200 000 awarded to the Conseil des recteurs et des principaux des universités du Québec (CREPUQ) to support the preparation of projects initiated in Québec.

5.2 French in information processing

The promotion of French in information processing is a prime concern of the Québec government, which multiplied its initiatives in this field in 1987-1988, notably by actively participating in national and international standardization committees and by implementing a francization policy for information technologies in the public administration.

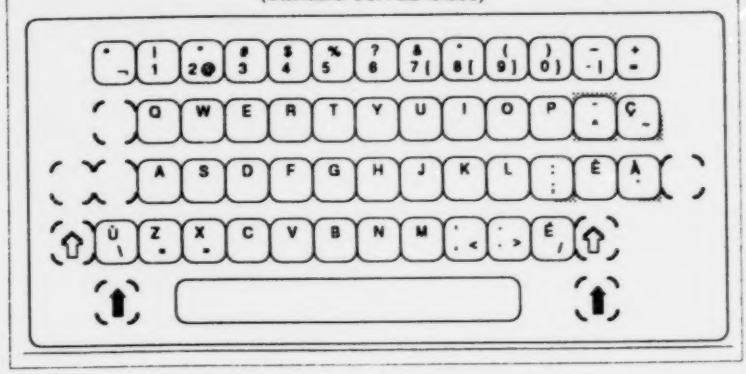
Over the past few years, the Québec government has made a major effort to promote French in information processing, both within the public administration and in Québec society as a whole.

The year 1987-1988 was particularly productive in this regard. The ministère des Communications was active on several national and international standardization committees. Its expertise was put to use by the Canadian Standards Association, which adopted a Canadian keyboard standard that takes the needs of both Francophone and Anglophone users into account.

A standards project that is broader in scope but less visible is the alphabetical classification of data in French. How must software classify data or words alphabetically while facilitating sorting and access and, particularly, while respecting correct usage in French? This project, which is in an earlier stage than the keyboard standards project, is nevertheless on its way to becoming another Canadian standard, the second of which the Québec government will be one of the main architects.

Internationally, the ministère des Communications championed national languages in information technologies. It acquired an enviable reputation by describing for the first time a whole series of functions whose integration into information processing systems will resolve most of the problems posed by the use of accented characters in data bases. Its concern for supporting languages is shared by the firms involved and several projects should come to fruition in the coming year.

Canadian keyboard for French and English
(Standard CSA Z243.200)



Within the public administration, the ministère des Communications, in conjunction with the Office de la langue française, set up a project to prepare a francization policy for information technologies, from microcomputers to large systems. Francization of this vast field depends upon a set of practices that must be integrated into the routine data processing activities of the public service. This policy will define the objects of francization in such sectors as product documentation, labelling, the availability of technical support in French, the coding of information, telecommunications, software and data bases.

A concern for the French language is also evident in the government's major calls for tender. The government now requires, inasmuch as possible, that business firms that submit bids respect the characteristics of the French language, particularly when they are bidding on hardware and software intended for a final user.

Also noteworthy is the effort of private firms which, under the initiative of the Centre de linguistique de l'entreprise (CLE), set up the Comité d'action pour le français en informatique au Canada. Representatives of several departments and agencies, including the ministère des Communications and the Office de la langue française, and of private firms and universities sit on the committee.

5.3 Economic partnership

The Québec government implemented a new policy of economic partnership that has generated investments of approximately $300 million in the advanced technology field.

In May 1987, the ministère de l'Industrie, du Commerce et de la Technologie (MICT) implemented a new information technologies purchasing policy in the Québec government. The policy is aimed at creating, through the government's purchasing power, a focal point for encouraging national and international leaders in information technologies to invest in Québec, thereby creating high-level jobs while multiplying business opportunities in Québec.

To this end, the MICT has developed the concept of economic balance, a measure of the economic impact of the activities of a business firm in Québec. Through this concept, a list has been drawn up of economic partners, from which government departments and agencies select suppliers for the purchase or leasing of goods related to information technologies.

This policy has had a huge economic impact on Québec. The direct impact of the initiative is estimated to be $300 million. In August 1988, no fewer than 114 firms met the requirements set by the policy.

The technological showcase is another initiative that should favour access to the government market by Québec companies in the information technologies field.

The government has also designed a technological showcase to foster the development of Québec firms. Originally a pilot project, the showcase is a demonstration centre that offers Québec suppliers of goods used in the information technologies and telecommunications fields space where they can promote their products and disseminate information of use to government and paragovernment clients. Located at 1500, boul. Charest Ouest in Sainte-Foy, the showcase is the responsibility of the ministère des Communications, in cooperation with the ministère de l'Industrie, du Commerce et de la Technologie, the ministère des Approvisionnements et Services and the Comité des responsables de l'informatique du secteur public (CRISP).

A final aspect that has a direct impact on the development of the technology industry concerns government contracts, particularly those for consultant services. The intentions expressed by the former Minister of Communications, Richard D. French, in this regard at the Québec technology

summit, held in the fall of 1988, are worth citing: "The objective of the Québec government is to consolidate government contracts as much as possible to enable firms in the province to establish their competence in the management of large projects and to foster strategic alliances between large service firms, specialized consultant firms and manufacturers".

5.4 Electronic information and data communications

An interdepartmental committee is preparing a government data bank dissemination policy. Several pilot projects in conjunction with Bell Canada's ALEX project are under way.

Because of its mandate and activities, the Québec government is a major producer of data banks. It is estimated that there are nearly a thousand data banks of public interest in the government administration.

In fact, among the government's computerized systems, nearly one-third contain public interest data banks. Solely for agencies with approved budgets, these systems cost about $80 million[1] in 1987-1988.

Any initiative to develop these data banks has multiple advantages, from which the government often derives benefits. On the one hand, promoting the banks for use by public agencies may prevent duplication and overlapping in the generation and collection of information. On the other, the wider circulation of these data banks for use by external clients may produce benefits that clearly exceed the associated marginal costs. More substantial efforts could be made to disseminate government data banks more widely, since only 10% are marketed.

In order to develop and circulate this information, an interdepartmental task force was set up to prepare a policy for the production and dissemination of government data banks. Last year, the committee coordinated several research projects, including a survey of the production and dissemination of data banks by the government and a survey of private enterprise's need for government information.

Although the policy has not yet been given the final go-ahead, data communications seem to be one of the means of dissemination that the government intends to use.

In this area, the government plans to act, on the one hand, as a supplier of services and, on the other, as a development agent by ensuring that the economic impact will benefit Québec.

Over the past year, the ministère des Communications has set up performance tests in five departments and two government agencies with a view to providing data communications services on an experimental basis in the framework of Bell Canada's ALEX project. These services will gradually become available beginning in late 1988 and the first quarter of 1989.

1 *This figure overestimates data processing expenditures attributable specifically to data banks. It does not, however, include non-computerized operations, a number of which are important to the production of a data bank, such as data collection.*

5.5 Geographic information processing

The government has developed a project to take advantage of all the existing and future geographic data. The project will yield benefits to public administrations as well as firms and the public.

Geographic information processing is the new science that combines several disciplines related to information about the territory (topometry, surveying, geodesy, remote sensing, photogrammetry). It calls upon techniques that relate data processing to the management, storage and transfer of data that have been or can be pinpointed in space. The science has made it possible to develop spatial reference information systems (SRIS) that offer immense opportunities for progress in the environmental field, forestry, mining resources, demography and public utilities.

The Québec government devotes some $70 million per year to the updating, manipulation and representation of territorial data as part of its various mandates. There are, in 24 government departments and agencies, about a hundred information systems whose data refer to spatial locations. However, these systems are often manual and cards are the main medium. Their limitations make them unsuitable for today's needs, and all the more so, for tomorrow's. A reform is needed.

An overall geographic information processing plan was prepared by four departments: the ministère des Transports, the ministère de l'Énergie et des Ressources, the ministère des Communications and the Conseil exécutif, which initiated the project. The plan should have three phases over a period of some 10 years.

The first phase, called the "start-up and implementation phase", will be completed by 1991 and will require investments of more than $8 million. During this phase, the government will conduct various studies that will make it possible to document and adopt standards for coding, digital qualification and the electronic exchange of data. Moreover, an interdepartmental pilot project is planned for a selected region to provide tangible evidence of what a system of data about the territory, with its various applications, could be.

The second phase of the plan, called the "accelerated development phase", will extend from 1991 to 1995. This will be the critical period during which substantial investments will be made to make use of the new techniques related to the implementation of geographic information processing.

The last phase, called the "operational phase", which will begin in 1995, is aimed at integrating and managing the technologies and systems to optimize the use of department and government resources and to enhance the effectiveness and performance of the systems. At that time, the departments will be able to gauge the return on the investment made in the preceding phases.

It is felt that the whole of the plan and the renovation of information systems will require major investments over a period of about 10 years. These investments will generate benefits for registry offices, the ministère des Transports, the ministère de la Sécurité publique, the ministère de l'Environnement, the ministère de l'Énergie et des Ressources, parapublic agencies and the public in general.

5.6 Technological strategies

In 1988, the Québec government decided upon technological strategies that established a number of guidelines and standards on the basis of which a consensus for future years will be arrived at. These strategies deal with four main aspects: the decompartmentalization of technologies, security, the economy and culture.

Over the past few years, the development of information processing technologies and telecommunications has revolutionized the structure of information systems, which little by little have become ubiquitous in organizations. Given all the human, organizational and economic issues, a number of guidelines, rules and standards must be established, on the basis of which a consensus for future years will be arrived at. In the wake of deep reflection within the government and comments by experts in the private sector, the ministère des Communications drafted a document containing the main principles and technological strategies that will guide the development of technologies in future years. These strategies deal with four main aspects.

The first is decompartmentalization. Technology in general and data processing in particular can no longer be the sole domain of computer experts. Data processing is an integral part of the life of organizations. For a maximum exchange of data, the sharing of information, regardless of the supplier of services, and the transferability of applications must be promoted and technological continuity provided for.

The second aspect involves security, a concern that has become one of prime importance with the development and accessibility of data banks. There is a demand for greater development of back-up systems and more assurance of the integrity, protection and confidentiality of applications and data.

The third aspect deals with the economy. In this regard, the government intends to rationalize the consumption of material and human data processing resources while using its purchasing power to contribute to the development of the Québec technology industry.

The last aspect is related to culture. Since technology is becoming increasingly generalized in society, respect for its characteristics and the use of the French language are of prime importance. The main steps taken to promote French in information technologies were mentioned in the first section of this chapter.

5.7 Telecommunications

A key challenge: a single infrastructure for voice, data and image transmission.

Telecommunications is another sector in which major changes have been under way these past few years. On the one hand, the technologies are increasingly sophisticated and efficient: the network capacity is increasing and the cost of hardware is declining. On the other, the new uses of information technologies favour increased demand for electronic information exchanges. Because of this, the Québec government must follow developments in the telecommunications sector attentively.

With this in mind, the ministère des Communications is developing a pilot project for Integrated Services Digital Networks (ISDN). Worldwide development favours the integration of telecommunications networks, which are now distinct for voice, data and image transmission, toward a single digital network. These networks will make it possible to send the user information in various forms with the same infrastructure. This strategy poses a key challenge for an organization of the size of the Québec government. With this new technology, it is possible to envisage a host of new services that could be developed and offered at reasonable cost. Its great potential for innovation would lead to improvement in the quality and efficiency of the services the government provides the public.

Another important technology closely monitored by the Québec government is Open Systems Interconnection (OSI). The convergence of telephony, data communications and data processing technologies requires specific standards in order to prevent major compatibility and interconnection problems. OSI was developed by the International Standards Organization (ISO) to unambiguously define how systems interconnection is to be carried out in the different supplier environments. The Canadian government adopted an OSI

guideline for its information systems and intends to require conformity with the standards beginning in the early 1990s for all data processing hardware and software. The Québec government, for its part, is actively participating and playing a leadership role on all OSI committees of strategic importance in Canada.

5.8 Software engineering

Automation of the software development process is required in order to respond more effectively to current demand and anticipated complexity.

Systems development and maintenance mobilize considerable financial resources in the Québec government. In 1987-1988, these activities required expenditures of some $190 million and had increased by an average of 14% each year for the previous seven years. This rise corresponds to the general increase in data processing expenditures.

Despite considerable effort by the government administration, like any other organization in developed countries, it takes about three years to satisfy user demand for the development and maintenance of applications, and the systems supplied are not always of the desired quality. The 1980s were marked by a desire to improve the productivity of development teams and to enhance system quality by following in the more demanding footsteps of engineering and architecture.

In the early 1980s, major efforts were made to make the development process more rigorous through structured methodologies. In the mid-1980s, software to aid in development started to be introduced to computerize certain parts of the structured methodologies. This marks the birth of software engineering. The computer expert is becoming computerized!

Another generation of software engineering is in the wings. It is known as the "integrated software engineering shop" or the "software factory". Its main characteristic depends upon the concept of integration. The integrated software engineering benches now being developed are intended to offer a set of compatible tools for all the phases of systems development, maintenance and use. The world powers are very interested in this sector of activity, particularly the European Economic Community, which is a step ahead of the other industrial powers, owing notably to exemplary cooperation on the part of the various economic partners that are its members.

Given the internationalization of markets, Québec must not remain on the fringe of this development if it wishes to take advantage of the enormous impact of this important market. The intention of the Québec government in this regard is two-pronged. It hopes, on the one hand, to foster the development of integrated software engineering benches in Québec through partnerships with universities, industry and government and, on the other, to promote their future use by government departments and agencies.

Collaboration at all levels is required so that Québec firms can compete on this very promising and strategic market and to ensure that alternatives are available on a market dominated until now by the major American software firms.

"Technology", a word uttered only by experts and visionaries 10 years ago, has become, over the past few years, a byword for managers. As this report illustrates, technology and its applications have invaded virtually all sectors of activity. A consensus of a sort has been arrived at regarding the need to invest in these means, which now are a guarantee of future prosperity.

But is the technological progress achieved in Québec over the last few years sufficient to maintain and improve our competitiveness on an international level? This report does not answer the question explicitly, but the computerization progress report on Québec society, presented in Chapter 2, discusses the many technological challenges to be faced in several sectors of activity.

The Québec government has long realized the strategic importance of these technologies. It has invested substantial amounts over the last five years to modernize the government apparatus and thereby profit from these technologies to improve management quality and customer services. Despite the efforts made, needs are still great and new opportunities offered by these technologies are constantly arising.

Because large investments have been made, the government has given special attention over the past few years to measuring the benefits generated by information technologies. It has acknowledged the need for cost-benefit analysis according to objective criteria and a recognized method.

The government is also concerned by the impact of these technologies on economic, cultural and social development. This is reflected in the main technological issues on which government authorities concentrated last year. The intentions expressed in this report highlight the government's determination to form a partnership with private enterprise and to ensure harmonious technological development that benefits the public as a whole.

At the dawn of the 1990s, it seems evident that the convergence of technologies, the growing need for standardization and the opening of markets, on the European as well as on the North American continent, will pose new challenges for our business firms.

A government partnership is the preferred model for Québec, since it will enable the government to guide the development of information technologies from a global, integrated perspective.

Statistical data

Table 6.1

List of departments and agencies that participated in the report on information technologies in 1987-1988[1]

Public sector department or agency	Agency whose budget is not voted by the National Assembly[5]
• Affaires culturelles	• Caisse de dépôt et de placement du Québec
• Affaires municipales	• Commission de la santé et de la sécurité du travail du Québec
• Agriculture, Pêcheries et Alimentation	• Commission des normes du travail
• Approvisionnements et Services	• Hydro-Québec
* • Assemblée nationale	• Office de la construction du Québec
• Bureau de la statistique du Québec	• Régie de l'assurance automobile du Québec
* • Commerce extérieur	• Régie de l'assurance-maladie du Québec
• Commission administrative des régimes de retraite et d'assurances	• Régie des rentes du Québec
• Commission des transports du Québec	• Société des alcools du Québec
• Communauté culturelles et Immigration	• Société des loteries et courses du Québec
• Communications	• Société immobilière du Québec
• Conseil du trésor	
* • Conseil exécutif	
• Direction générale de l'informatique (Communications)[2]	
• Éducation	
• Énergie et Ressources	
• Enseignement supérieur et Science	
• Environnement	
• Finances	
• Industrie, Commerce et Technologie	
• Inspecteur général des institutions financières	
• Justice	
• Loisir, Chasse et Pêche	
• Main-d'œuvre et Sécurité du revenu	
• Office de la langue française	
* • Office de planification et de développement du Québec	
• Office des ressources humaines	
• Office du crédit agricole du Québec	
• Revenu	
• Santé et Services sociaux	
• Sécurité publique[3]	
• Société d'habitation du Québec	
• Transports	
• Travail[4]	

1 The asterisk indicates departments and agencies that participated for the first time.

2 The Direction générale de l'informatique is shown separately from the ministère des Communications because of its role as a data processing service centre for departments and agencies throughout the government.

3 The ministère de la Sécurité publique has assumed all or part of the former responsibilities of the ministère de la Justice and the Sûreté du Québec.

4 Data concerning security in public buildings and public places were integrated with that concerning the ministère du Travail.

5 In contrast to previous years, Sidbec is not included in this report, given the nature of its operations.

Table 6.2

Data processing expenditures in the public sector from 1985 to 1990

Resources	1985-1986		1986-1987		1987-1988		1988-1989		1989-1990	
	$ 000	%	$ 000	%	$ 000	%	$ 000	%	$ 000	%
Specific costs										
Personnel	75 528.8	*32.9*	79 992.5	*32.8*	96 157.2	*35.1*	109 719.6	*34.1*	114 573.2	*35.6*
Hardware leased or purchased	52 477.5	*22.8*	51 894.5	*21.4*	62 224.2	*22.0*	66 515.2	*20.7*	68 323.0	*21.2*
Software leased or purchased	6 891.3	*3.0*	7 901.2	*3.2*	7 939.1	*2.8*	9 898.8	*3.1*	9 312.4	*2.9*
Data processing communications	6 970.6	*3.0*	7 899.4	*3.2*	7 917.6	*2.9*	9 766.2	*3.0*	11 514.1	*3.6*
Data processing supplies	3 361.5	*1.5*	4 122.7	*1.7*	4 029.1	*1.5*	4 887.0	*1.5*	5 216.5	*1.6*
Contractual professional and technical services[1]	29 707.3	*12.9*	31 519.4	*12.9*	31 986.3	*11.7*	45 531.3	*14.2*	36 501.3	*11.3*
Travel, office supplies, courses, etc.	5 306.7	*2.3*	4 894.7	*2.0*	4 764.3	*1.7*	6 210.1	*1.9*	5 382.2	*1.7*
Total for specific costs	**180 243.7**	***78.5***	**188 224.4**	***77.2***	**213 017.8**	***77.7***	**252 528.2**	***78.5***	**250 822.7**	***77.9***
Standardized costs										
Fringe benefits	9 757.3	*4.2*	10 539.6	*4.3*	12 563.2	*4.6*	14 446.1	*4.5*	15 170.7	*4.7*
Rent, furniture, telephone, security	16 299.6	*7.1*	19 273.7	*7.9*	22 498.9	*8.2*	23 991.1	*7.5*	25 585.4	*7.9*
Departmental administrative services and centralized services	23 406.7	*10.2*	25 683.9	*10.6*	26 039.0	*9.5*	30 647.4	*9.5*	30 406.6	*9.5*
Total for standardized costs	**49 463.6**	***21.5***	**55 497.2**	***22.8***	**61 101.1**	***22.3***	**69 084.6**	***21.5***	**71 162.7**	***22.1***
Total costs	**229 707.3**	***100.0***	**243 721.6**	***100.0***	**274 118.9**	***100.0***	**321 612.8**	***100.0***	**321 985.4**	***100.0***
Annual rate of growth		***16.4***		***6.1***		***12.4***		***17.3***		***0.1***

1 The specific costs reported for contractual professional and technical services include the costs of service by private enterprise and those of agencies whose budgets are not voted by the National Assembly.

Table 6.3

Data processing expenditures in agencies whose budgets are not voted by the National Assembly, from 1985 to 1990

Resources	1985-1986		1986-1987		1987-1988		1988-1989		1989-1990	
	$ 000	%	$ 000	%	$ 000	%	$ 000	%	$ 000	%
Specific costs										
Personnel	72 365	*29.6*	79 678	*31.3*	76 809	*31.1*	86 216	*30.7*	88 496	*30.5*
Hardware leased or purchased	63 669	*26.1*	58 693	*23.1*	54 655	*22.1*	61 178	*21.8*	62 401	*21.6*
Software leased or purchased	9 092	*3.7*	9 875	*3.9*	11 749	*4.7*	14 690	*5.2*	14 939	*5.2*
Data processing communications	8 739	*3.6*	8 223	*3.2*	8 692	*3.5*	10 301	*3.7*	10 644	*3.7*
Data processing supplies	3 820	*1.6*	3 512	*1.4*	3 179	*1.3*	3 425	*1.2*	3 795	*1.3*
Contractual professional and technical services	32 164	*13.2*	34 552	*13.6*	35 011	*14.2*	42 089	*15.0*	42 441	*14.7*
Travel, office supplies, courses, etc.	1 755	*0.7*	1 852	*0.7*	2 069	*0.8*	2 587	*0.9*	2 661	*0.9*
Total for specific costs	**191 604**	***78.5***	**196 385**	***77.2***	**192 164**	***77.7***	**220 486**	***78.5***	**225 377**	***77.9***
Standardized costs[1]	**52 478**	***21.5***	**57 999**	***22.8***	**55 151**	***22.3***	**60 387**	***21.5***	**63 938**	***22.1***
Total costs	**244 082**	***100.0***	**254 384**	***100.0***	**247 315**	***100.0***	**280 873**	***100.0***	**289 315**	***100.0***
Annual rate of growth		***2.9***		***4.2***		***(2.8)***		***13.5***		***3.0***

1 Standardized costs have been established by the ministère des Communications assuming that their relative importance was the same as that reported by the public sector.

Table 6.4

Data processing expenditures by department and agency[1] from 1985 to 1990

Department or agency	1985-1986 $ 000	1986-1987 $ 000	1987-1988 $ 000	1988-1989 $ 000	1989-1990 $ 000
Revenu	29 931.9	33 523.7	39 888.3	54 642.0	41 342.4
Main-d'œuvre et Sécurité du revenu	20 902.2	23 457.9	27 002.2	31 398.5	33 052.3
Direction générale de l'informatique (Communications)	22 042.5	27 072.1	25 939.9	28 239.4	29 892.0
Justice	29 576.4	27 202.3	23 124.2	27 484.5	28 636.9
Transports	16 885.8	16 358.6	21 731.1	24 143.9	27 542.4
Éducation	22 494.9	20 675.1	20 340.1	21 699.4	23 090.7
Sécurité publique	—	—	15 028.7	17 130.3	18 574.0
Finances	9 817.1	10 204.3	12 885.4	15 243.3	15 778.1
Énergie et Ressources	7 265.2	9 521.7	10 836.2	10 738.2	11 485.9
Santé et Services sociaux	8 872.2	9 713.1	10 222.9	11 761.9	12 392.8
Communications	6 403.1	9 946.7	9 690.6	10 402.6	9 730.0
Agriculture, Pêcheries et Alimentation	6 635.5	9 004.7	9 544.6	9 988.1	10 424.5
Enseignement supérieur et Science	10 122.5	7 531.0	9 178.7	11 495.1	11 586.0
Office des ressources humaines	7 237.0	7 796.6	8 389.9	9 773.7	10 709.3
Loisir, Chasse et Pêche	5 239.2	5 744.1	8 353.8	9 885.1	10 791.0
Environnement	3 628.2	4 135.2	6 301.5	7 005.9	7 766.8
Commission administrative des régimes de retraite et d'assurances	4 060.9	5 105.6	6 161.8	6 472.7	6 446.3
Travail	2 830.7	3 024.7	6 142.2	6 341.8	6 544.6
Société d'habitation du Québec	5 329.0	5 302.9	5 636.4	5 720.4	5 846.9
Inspecteur général des institutions financières	4 647.5	4 898.0	4 970.5	5 124.7	5 216.2
Affaires culturelles	2 151.3	2 787.7	3 311.0	3 414.7	3 532.7
Commission des transports du Québec	2 853.2	2 956.5	3 229.7	3 201.8	3 353.2
Office de la langue française	2 687.7	2 463.1	2 554.0	2 664.4	2 953.6
Assemblée nationale	—	—	2 484.0	4 455.0	3 856.5
Affaires municipales	1 821.0	1 962.6	2 254.2	2 243.8	2 333.4
Bureau de la statistique du Québec	1 874.9	2 161.4	2 178.3	2 184.4	2 220.6
Office du crédit agricole du Québec	1 140.2	1 123.0	1 825.4	3 645.4	6 001.9
Conseil du trésor	1 221.1	1 717.7	1 791.4	2 642.1	2 774.5
Approvisionnements et Services	736.9	881.2	1 690.2	2 860.9	3 479.7
Conseil exécutif	—	—	1 608.0	1 728.3	1 579.5
Communautés culturelles et Immigration	1 128.3	1 382.7	1 425.7	1 879.4	2 063.6
Industrie, Commerce et Technologie	425.4	801.1	1 060.5	1 009.4	1 056.4
Commerce extérieur	—	—	756.7	952.4	
Office de planification et de développement du Québec	—	—	284.1	493.6	563.6

1 Departments and agencies are listed according to the size of their integral costs in 1987-1988, which include interdepartmental services.

Table 6.5

Data processing expenditures by agency whose budget is not voted by the National Assembly,[1] from 1985 to 1990

Agency	1985-1986 $ 000	1986-1987 $ 000	1987-1988 $ 000	1988-1989 $ 000	1989-1990 $ 000
Hydro-Québec	66 847	71 569	75 849	81 720	82 349
Régie de l'assurance automobile du Québec	38 088	39 917	40 260	44 480	44 823
Société des loteries et courses du Québec	40 005	42 131	37 709	44 441	46 576
Commission de la santé et de la sécurité du travail du Québec	34 251	29 027	28 104	39 797	41 624
Régie de l'assurance-maladie du Québec	25 055	26 224	21 245	23 192	24 714
Régie des rentes du Québec	10 432	13 918	15 149	14 704	15 353
Société des alcools du Québec	8 332	7 911	8 789	10 259	10 855
Société immobilière du Québec	4 461	6 044	5 431	5 803	5 923
Commission des normes du travail	4 797	5 627	5 279	6 769	7 273
Caisse de dépôt et de placement du Québec	2 803	4 313	4 894	3 885	4 214
Office de la construction du Québec	4 483	3 437	4 605	5 823	5 611
Sidbec-Dosco	4 529	4 267	—	—	—

1 Agencies are listed according to the amount of their integrated costs in 1987-1988.

Table 6.6

Data processing expenditures in the public sector compared with operating expenditures of the Québec government, from 1985 to 1990

Expenditures	1985-1986		1986-1987		1987-1988		1988-1989		1989-1990	
	$ 000	%	$ 000	%	$ 000	%	$ 000	%	$ 000	%
Data processing expenditures	229 707.3		243 721.6		274 118.9		321 612.8		321 985.4	
Annual growth		*16.4*		*6.1*		*12.4*		*17.3*		*0.1*
Data processing expenditures in the public sector	226 081.0		238 864.9		268 842.8		316 107.8		316 474.0[1]	
Annual growth		*16.1*		*5.7*		*12.6*		*17.6*		*0.1*
Operating expenditures	3 664 325.0		3 786 324.0		4 180 000.0[2]		4 678 000.0[2]		5 176 000.0[3]	
Annual growth		*9.1*		*3.3*		*10.4*		*11.9*		*10.6*
Ratio: Data processing expenditures in the public sector / Operating expenditures		*6.2*		*6.3*		*6.4*		*6.8*		*6.1*

1 Data processing expenditures in the public sector for 1989-1990 have been established by the ministère des Communications on the basis of the proportions of the previous year.

2 Operating expenditures of the Québec government for 1987-1988 and 1988-1989 are drawn from the Budgets of the years in question.

3 The operating expenditures of the Québec government for 1989-1990 have been established by the ministère des Communications, assuming that growth will be the same as in the preceding year.

Table 6.7

Source of data processing services received by the public sector from 1985 to 1990

Sources	1985-1986		1986-1987		1987-1988		1988-1989		1989-1990	
	$ 000	%	$ 000	%	$ 000	%	$ 000	%	$ 000	%
Internal suppliers	177 463.1	*77.3*	184 817.3	*75.8*	208 052.8	*75.9*	239 330.1	*74.5*		
Interdepartmental suppliers	22 310.3	*9.7*	27 085.8	*11.2*	33 703.3	*12.3*	36 454.3	*11.3*		
Private enterprise	25 954.1	*11.3*	26 845.8	*11.0*	26 134.3	*9.5*	40 978.4	*12.7*	Not available	
Parapublic sector and agencies whose budgets are not voted by the National Assembly	3 979.8	*1.7*	4 972.7	*2.0*	6 228.5	*2.3*	4 850.0	*1.5*		
Total	**229 707.3**	***100.0***	**243 721.6**	***100.0***	**274 118.9**	***100.0***	**321 612.8**	***100.0***		

Table 6.8

Breakdown of data processing expenditures of the public sector by production function, from 1985 to 1990

Production function	1985-1986		1986-1987		1987-1988		1988-1989		1989-1990	
	$ 000	%	$ 000	%	$ 000	%	$ 000	%	$ 000	%
Data entry	23 705.7	*10.4*	23 172.5	*9.5*	23 764.4	*8.7*	27 702.6	*8.6*	26 703.7	*8.3*
Processing	107 037.4	*46.6*	109 967.5	*45.1*	124 738.6	*45.5*	138 179.4	*43.0*	144 852.2	*45.0*
Analysis and programming	66 459.4	*28.9*	72 540.1	*29.8*	83 226.1	*30.4*	105 686.3	*32.9*	99 736.2	*31.0*
Technical support	15 457.8	*6.7*	18 692.5	*7.7*	18 954.2	*6.9*	22 914.6	*7.1*	25 116.5	*7.8*
Administration	17 047.0	*7.4*	19 349.0	*7.9*	23 435.6	*8.5*	27 129.9	*8.4*	25 576.8	*7.9*
Total	**229 707.3**	***100.0***	**243 721.6**	***100.0***	**274 118.9**	***100.0***	**321 612.8**	***100.0***	**321 985.4**	***100.0***

Table 6.9

Breakdown of data processing expenditures by type of service rendered, from 1985 to 1990

Type of service	1985-1986		1986-1987		1987-1988		1988-1989		1989-1990	
	$ 000	%	$ 000	%	$ 000	%	$ 000	%	$ 000	%
Development	53 712.8	*23.4*	55 083.2	*22.7*	59 733.8	*21.8*				
Maintenance	34 492.2	*15.0*	34 950.3	*14.3*	45 573.4	*16.6*				
Production	139 152.6	*60.6*	141 516.3	*58.0*	162 138.9	*59.2*	Not available			
Other	2 349.7	*1.0*	12 171.8	*5.0*	6 672.8	*2.4*				
Total	**229 707.3**	***100.0***	**243 721.6**	***100.0***	**274 118.9**	***100.0***				

Table 6.10

Breakdown of data processing expenditures of agencies whose budgets are not voted by the National Assembly, by type of service rendered, from 1985 to 1990

Type of service	1985-1986		1986-1987		1987-1988		1988-1989		1989-1990	
	$ 000	%	$ 000	%	$ 000	%	$ 000	%	$ 000	%
Development	58 873	*24.1*	56 679	*22.3*	54 690	*22.1*				
Maintenance	26 176	*10.7*	31 933	*12.6*	32 324	*13.1*	Not available			
Production	159 033	*65.2*	165 773	*65.2*	160 301	*64.8*				
Total	**244 082**	***100.0***	**254 385**	***100.0***	**247 315**	***100.0***				

Table 6.11

Breakdown of data processing expenditures of the public sector by clientele served, from 1985 to 1990

Clientele served	1985-1986		1986-1987		1987-1988		1988-1989		1989-1990	
	$ 000	%	$ 000	%	$ 000	%	$ 000	%	$ 000	%
Public sector	226 081.0	*98.4*	238 864.9	*98.0*	268 842.8	*98.1*	316 107.8	*98.3*		
Parapublic sector and agencies whose budgets are not voted by the National Assembly	3 107.5	*1.4*	4 450.8	*1.8*	4 804.4	*1.7*	4 963.2	*1.5*	Not available	
Private enterprise	518.8	*0.2*	405.9	*0.2*	471.7	*0.2*	541.8	*0.2*		
Total	**229 707.3**	***100.0***	**243 721.6**	***100.0***	**274 118.9**	***100.0***	**321 612.8**	***100.0***		

Table 6.12

Value by mandate and area of data processing services rendered in the public sector, from 1985 to 1990

Mandate and area	1985-1986		1986-1987		1987-1988		1988-1989		1989-1990	
	$ 000	%	$ 000	%	$ 000	%	$ 000	%	$ 000	%
Economic mandate										
Natural resources and primary industries	17 334.5	*7.7*	23 750.5	*9.9*	26 062.9	*9.7*				
Secondary industries	2 423.1	*1.1*	3 078.5	*1.3*	1 452.9	*0.3*				
Services	2 732.9	*1.2*	3 193.0	*1.3*	7 825.1	*2.9*	Not available			
Human resources	4 696.2	*2.1*	5 168.6	*2.2*	5 276.2	*2.1*				
Transport	17 321.7	*7.7*	18 548.0	*7.8*	22 589.5	*8.5*				
Total for economic mandate	**44 508.4**	***19.8***	**53 738.6**	***22.5***	**63 206.6**	***23.5***				
Educational and cultural mandate										
Education	32 585.3	*14.4*	26 919.4	*11.3*	17 549.2	*6.5*				
Culture	4 839.0	*2.1*	5 300.0	*2.2*	5 790.0	*2.1*	Not available			
Recreation and wildlife	3 681.6	*1.6*	2 583.3	*1.1*	7 478.7	*2.8*				
Total for educational and cultural mandate	**41 105.9**	***18.1***	**34 802.7**	***14.6***	**30 817.9**	***11.4***				
Social mandate										
Income security	21 833.2	*9.7*	24 815.3	*10.4*	26 276.6	*9.8*				
Health and social adjustment	7 147.2	*3.2*	7 724.3	*3.2*	20 895.6	*7.7*	Not available			
Housing	5 856.8	*2.6*	5 707.7	*2.4*	5 690.3	*2.2*				
Total for social mandate	**34 837.2**	***15.4***	**38 247.3**	***16.0***	**52 862.5**	***19.7***				
Governmental and administrative mandate										
Political institutions	19 112.9	*8.5*	14 950.3	*6.3*	21 039.2	*7.7*				
Central administrative management	63 593.8	*28.1*	77 520.8	*32.4*	78 202.3	*29.2*	Not available			
Protection of people and property	22 922.8	*10.1*	19 605.2	*8.2*	22 714.3	*8.5*				
Total for governmental and administrative mandate	**105 629.5**	***46.7***	**112 076.3**	***46.9***	**121 955.8**	***45.4***				
Total value of data processing services	**226 081.0**	***100.0***	**238 864.9**	***100.0***	**268 842.8**	***100.0***				

Table II.23

Person-years worked by the internal personnel of the public sector, from 1985 to 1988

Department or agency	1985- 1986	1986-1987	1987-1988
Revenu	515	545	680
Main-d'œuvre et Sécurité du revenu	346	335	450
Direction générale de l'informatique(Communications)	254	243	232
Éducation	231	231	223
Justice	280	306	186
Transports	111	118	155
Finances	140	131	136
Sécurité publique	70	66	105
Santé et Services sociaux	103	101	99
Office des ressources humaines	94	82	80
Agriculture, Pêcheries et Alimentation	58	69	75
Communications	42	73	74
Enseignement supérieur et Science	86	64	73
Travail	69	72	73
Loisir, Chasse et Pêche	37	55	73
Société d'habitation du Québec	63	52	62
Environnement	46	50	57
Énergie et Ressources	57	55	56
Commission administrative des régimes de retraite et d'assurances	44	48	54
Commission des transports du Québec	35	32	36
Office de la langue française	39	34	34
Inspecteur général des institutions financières	24	32	32
Bureau de la statistique du Québec	35	31	31
Affaires culturelles	25	23	27
Affaires municipales	27	23	25
Office du crédit agricole du Québec	6	13	24
Conseil exécutif	—	—	22
Approvisionnement et Services	5	6	16
Assemblée nationale	—	—	15
Conseil du trésor	8	11	14
Communautés culturelles et Immigration	10	12	11
Commerce extérieur	—	—	11
Industrie, Commerce et Technologie	1	6	7
Office de planification et de développement du Québec	—	—	1
Total	**2 861**	**2 919**	**3 249**

Table 6.14

Person-years worked by the internal personnel of agencies whose budgets are not voted by the National Assembly, from 1985 to 1988

Agency	1985- 1986	1986-1987	1987-1988
Hydro-Québec	728	730	699
Régie de l'assurance automobile du Québec	217	317	330
Régie de l'assurance-maladie du Québec	496	505	319
Commission de la santé et de la sécurité du travail du Québec	238	209	209
Société des loteries et courses du Québec	216	197	179
Régie des rentes du Québec	107	130	152
Société des alcools du Québec	101	94	97
Office de la construction du Québec	66	65	67
Commission des normes du travail	44	53	62
Société immobilière du Québec	61	55	48
Caisse de dépôt et de placement du Québec	20	25	28
Total	**2 294**	**2 380**	**2 190**

Table 6.15

Person-years worked in the public sector in 1987-1988, by production function and job category

Production function	Management	Analysts	Technicians	Operators	Auxiliaries
Entry	1.1	2.4	4.7	2.1	298.6
Processing	12.1	109.9	111.1	101.0	9.2
Analysis and programming	28.4	653.0	296.3	5.5	8.4
Technical support	8.3	161.1	72.5	2.6	2.0
Administration	45.9	82.3	3.4	0.0	0.9
Total	**95.8**	**1 008.7**	**488.0**	**111.2**	**319.1**
Distribution of permanent personnel	*3.6%*	*38.5%*	*18.6%*	*4.2%*	*12.1%*

Production function	Other personnel (production)	Other personnel (support)	Total permanent personnel	Casual personnel	Grand total
Entry	126.9	24.8	460.6	262.9	723.5
Processing	85.4	51.1	479.8	132.2	612.0
Analysis and programming	60.2	62.3	1 114.1	177.2	1 291.3
Technical support	8.9	40.5	295.9	28.7	324.6
Administration	28.5	115.2	276.2	17.1	293.3
Total	**309.9**	**293.9**	**2 626.6**	**618.1**	**3 244.7**
Distribution of permanent personnel	*11.8%*	*11.2%*	*100.0%*	—	—

Table 6.16

Wages paid in the public sector in 1987-1988, by production function and job category

Production function	Management $ 000	Analysts $ 000	Technicians $ 000	Operators $ 000	Auxiliaries $ 000
Entry	56.0	99.1	122.7	59.2	5 737.9
Processing	697.1	4 348.4	3 212.3	2 705.9	173.5
Analysis and programming	1 643.1	25 884.3	8 260.9	145.3	166.3
Technical support	469.9	6 418.3	2 008.2	62.3	39.8
Administration	2 667.8	3 529.3	90.6	0.0	18.1
Total	**5 533.9**	**40 279.4**	**13 694.7**	**2 972.7**	**6 135.6**
Average wage	*57.8*	*39.9*	*28.1*	*26.7*	*19.2*

Production function	Other personnel (production) $ 000	Other personnel (support) $ 000	Total permanent personnel $ 000	Casual personnel $ 000	Grand total $ 000
Entry	2 754.6	670.8	9 500.3	4 974.8	14 475.1
Processing	2 480.4	1 281.4	14 899.0	1 169.7	16 068.7
Analysis and programming	1 879.7	1 351.6	39 331.2	4 952.4	44 283.6
Technical support	240.0	1 089.2	10 327.7	748.8	11 076.5
Administration	786.3	2 729.6	9 821.7	431.6	10 253.3
Total	**8 141.0**	**7 122.6**	**83 879.9**	**12 277.3**	**96 157.2**
Average wage	*26.3*	*24.2*	*31.9*	*19.9*	*29.6*

Table 6.17

Main private firms[1] that provided the public sector with professional data processing services in 1987-1988

Private firm	Number of departments concerned	Entry	Processing	Analysis and programming	Technical support	Administration	Total
		$ 000	$ 000	$ 000	$ 000	$ 000	$ 000
ACSI ltée	8	15.3	248.9	50.6	5.0	—	319.8
Atkinson, Tremblay et associés inc.	10	—	4.9	729.9	—	5.8	740.6
Becterm inc.	1	—	—	66.7	147.0	—	213.7
Biro inc.	2	—	—	153.5	—	—	153.5
Centre de technique de l'informatique inc.	6	127.6	—	3.9	—	—	131.5
Conseillers en gestion et informatique CGI inc.	20	15.0	2 332.9	2 199.3	246.3	254.0	5 047.5
DPLA—Drouin, Painchaud, Longchamps et associés inc.	8	—	—	91.6	—	100.2	191.8
Groupe DMR inc.	22	—	293.2	2 553.5	32.3	161.1	3 040.1
ESP Personnel de systèmes électroniques (Québec) ltée	3	—	—	145.2	—	—	145.2
Gespro informatique inc.	8	—	1.5	104.4	—	57.2	163.1
Grenier, St-Pierre et associés inc.	12	—	79.5	907.7	4.8	55.0	1 047.0
LGS Conseillers en informatique inc.	14	—	249.3	797.2	28.4	78.6	1 153.5
La société-conseil Lambda inc.	8	—	—	307.9	—	40.9	348.8
Le groupe McNeil, Boisvert et Melançon	6	—	83.5	149.9	—	—	233.4
Les services-conseils Systématix consultants inc.	12	—	15.0	747.1	70.7	4.0	836.8
Les solutions informatiques CDC inc.	3	226.8	—	—	—	—	226.8
Les systèmes MICR ltée	7	—	153.1	—	—	2.8	155.9
L'Industrielle, services techniques inc.	20	242.3	1 806.5	819.1	42.9	1 305.0	4 215.8
L'Info-conseil inc.	3	—	—	181.8	4.9	—	186.7
Logidec inc.	5	—	1 163.1	—	—	—	1 163.1
Price Waterhouse	5	—	—	268.9	—	28.2	297.1
Roy, Bourassa et associés inc.	12	4.3	54.4	85.4	13.8	46.8	204.7
Somapro ltée	5	—	65.8	43.0	—	8.0	116.8
Systemhouse	3	—	17.8	79.4	—	30.0	127.2
UTLAS	5	212.0	284.6	—	—	—	496.6
Total	—	**843.3**	**6 854.0**	**10 486.0**	**596.1**	**2 177.6**	**20 957.0**
Relative importance	—	*4.0%*	*32.7%*	*50.1 %*	*2.8%*	*10.4%*	*100.0 %*

1 Includes only firms that had contracts in 1987-1988 worth over $100 000.

Mainframe computers and peripherals in the public sector, as at March 31, 1988

Department or agency	Central processor	Internal memory (megabytes)		Number of channels	Relative power	Storage capacity	Number of read heads	Number of tapes or cassettes
		real	extended		(MIPS)	(gigabytes)		
Direction générale de l'informatique (Communications)	IBM 3084-Q	64	—	48	28.0	220.0	41	45 000
	NAS AS/XL80	192	—	40	41.0	—	—	—
Éducation	IBM 3090-200	64	64	32	28.0	97.5	16	19 588
Conseil du trésor and Finances	IBM 4381-R14	32	—	12	6.5	10.0	2	NA*
Justice	IBM 3090-200	64	—	32	28.0	65.0	16	10 841
Main-d'œuvre et Sécurité du revenu	IBM-3090-200	64	—	32	28.0	65.0	12	13 300
Revenu	IBM 3090-400E	128	128	80	64.0	115.0	22	31 000
Sécurité publique	IBM 3084-QX	96	—	48	30.0	45.0	6	NA*
Total					**253.5**	**617.5**	**115**	**119 729**

Note: Turntables and tape drives are shared by the computers in centres operating more than one computer.

*NA: Not available.

Table 6.19

Mainframe computers and peripherals in agencies with budgets not voted by the National Assembly, as at March 31, 1988

Agency	Central processor	Internal memory (megabytes)		Number of channels	Relative power	Storage capacity	Number of read heads	Number of tapes or cassettes
		real	extended		(MIPS)	(gigabytes)		
Caisse de dépôt et de placement du Québec	IBM 4381-P13	16	—	6	3.7	17.0	2	1 500
Commission de la santé et de la sécurité du travail du Québec	IBM 3084Q	64	—	48	28.0	195.0	16	NA*
	IBM 3084Q	96	—	48	28.0	—	—	—
Commission des normes du travail	IBM 4381-R14	32	—	12	6.5	17.5	2	2 500
Hydro-Québec	IBM 3090-200E	64	64	32	32.0	293.2	52	25 104
	AMDAHL 5880	96	—	32	22.0	—	—	—
	IBM 4381-13	16	—	6	3.7	—	—	—
Office de la construction du Québec	IBM 4381-13	16	—	6	3.7	17.5	8	NA*
Régie de l'assurance automobile du Québec	IBM 3090-400	256	—	80	80.0	185.0	18	27 250
	IBM 3090-200	128	—	48	48.0	—	—	—
Régie de l'assurance-maladie du Québec	AMDAHL 5090-300	128	—	40	40.0	112.5	34	25 000
Régie des rentes du Québec	IBM 3081 G	32	—	16	10.2	68.0	15	14 080
Société des alcools du Québec	IBM 4381-2	16	—	12	2.7	36.0	5	3 600
	IBM 4381-2	16	—	12	2.7	—	—	—
Société des loteries et courses du Québec	IBM 3081-D	24	—	16	10.2	23.5	12	22 000
	IBM 3083-B	24	32	16	5.7	—	—	—
Société immobilière du Québec	IBM 4381-P03	16	—	10	4.8	17.5	4	3 000
Total					**282.9**	**982.1**	**168**	**124 034**

Note: Turntables and tape drives are shared by the computers in centres operating more than one computer.

*NA: Not available.

Table 6.20

Evolution of computing power and disk storage capacity in the public sector, 1984 to 1988[1]

	1984	1985	1986	1987	1988
Computing power (MIPS)	56.2	104.8	108.5	208.5	253.5
Growth rate	*13.0%*	*86.5%*	*3.5%*	*92.2%*	*21.6%*
Disk capacity (gigabytes)	231.5	302.8	373.0	448.0	617.5
Growth rate	*64.0%*	*30.8%*	*23.2%*	*20.1%*	*37.8%*

1 As at March 31 each year.

Evolution of computing power and disk storage capacity in agencies with budgets not voted by the National Assembly, 1984 to 1988[1]

	1984	1985	1986	1987	1988
Computing power (MIPS)	97.1	138.3	226.7	250.2	282.9
Growth rate	*5.3%*	*42.4%*	*63.9%*	*10.4%*	*13.1%*
Disk capacity (gigabytes)	286.7	391.0	620.0	820.0	982.1
Growth rate	*5.2%*	*36.4%*	*58.6%*	*32.3%*	*19.8%*

1 As at March 31 each year.

Table 6.22

Evolution of the number of interactive terminals, microcomputers and word processors in the public sector, 1986 to 1990[1]

	1986	1987	1988	1989	1990
Number of interactive terminals	6 113	7 502	8 553	9 699	12 462
Growth rate	*43.7%*	*22.7%*	*14.0%*	*13.4%*	*28.5%*
Number of microcomputers	1 916	2 855	5 262	7 974	9 942
Growth rate	*123.3%*	*49.0%*	*84.3%*	*51.5%*	*24.7%*
Number of word processors	1 647	1 752	1 894	1 902	1 867
Growth rate	*29.2%*	*6.4%*	*8.1%*	*0.4%*	*(1.8%)*

1 As at March 31 each year.

Evolution of the number of interactive terminals, microcomputers and word processors in agencies with budgets not voted by the National Assembly, 1986 to 1990[1]

	1986	1987	1988	1989	1990
Number of interactive terminals	7 175	8 307	8 097	10 288	NA*
Growth rate	*22.6%*	*15.8%*	*(2.5%)*	*27.1%*	NA*
Number of microcomputers	2 488	4 441	5 047	6 054	7 035
Growth rate	*211.4%*	*78.5%*	*13.6%*	*20.0%*	*16.2%*
Number of word processors	1 073	1 003	890	848	819
Growth rate	*77.1%*	*(6.5%)*	*(11.3%)*	*(4.7%)*	*(3.4%)*

1 As at March 31 each year.

*NA: Not available

Table 6.24

Assets of the Fonds renouvelable pour les équipements informatiques (FREI), 1987 to 1988[1]

Computer hardware	1987	1988
Computers		
Quantity	7	9
Purchase cost ($ 000)	33 190.2	49 972.2
Market value ($ 000)	21 250.0	29 400.0
Annual leasing revenue ($ 000)	8 057.6	9 318.5
Communication controllers		
Quantity	5	6
Purchase cost ($ 000)	1 500.4	1 757.2
Market value ($ 000)	865.0	600.0
Annual leasing revenue ($ 000)	501.2	497.8
Disk drives		
Quantity	50	52
Purchase cost ($ 000)	4 487.8	4 728.5
Market value ($ 000)	1 000.0	500.0
Annual leasing revenue ($ 000)	986.4	545.4
Tape drives		
Quantity	78	78
Purchase cost ($ 000)	672.7	672.7
Market value ($ 000)	40.0	20.0
Annual leasing revenue ($ 000)	370.2	281.3
Total		
Purchase cost ($ 000)	39 851.1	57 130.6
Market value ($ 000)	23 155.0	30 520.0
Annual leasing revenue ($ 000)	9 915.4	10 643.0

1 As at March 31 each year.

Table 6.25

Number of employees per computerized work station in the Québec government, 1986 to 1990[1]

	1986	1987	1988	1989	1990
Public sector	6.3	4.3	3.5	2.8	2.3
Agencies with non-approved budgets	2.3	1.9	1.8	1.4	NA*

1 As at March 31 each year.

*NA: Not available

Note: These figures are obtained by dividing the number of permanent and casual employees by the number of microcomputers, word processors, board display terminals and keyboard printers in stock (employment categories that are less likely to be affected have been excluded).

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Integral costs — All specific and standardized costs; total data processing costs.

Standardized costs — Consist of:

- the cost of fringe benefits of data processing personnel;
- part of the department's overhead, such as rent, heating, electricity and maintenance;
- indirect administrative costs determined by the department;
- the cost of services rendered by government agencies.

Specific costs — The cost of resources controlled directly by the data processing directors of departments and agencies. Among these resources are personnel, hardware, contractual services and data processing communications.

Systems development — The administrative design, technical production and implementation of:

- new systems;
- systems reengineering;
- the addition of functions to existing systems;
- *ad hoc* requests respecting existing files or files to be created.

Systems maintenance — The tasks related to systems in operation, such as processing whose output has already been sent to users. All these tasks are part of the updating of the system, that is, changes that are periodically needed and that tailor the system to current requirements. Maintenance also includes minor changes that improve the performance, reliability or security of a system.

Production — All the tasks related to the recording of data, computer processing and the transcription of results on the same or another medium.

Data processing services — All the entry, processing, analysis, programming, technical support and administrative services of data processing.

Interdepartmental services — Data processing services rendered by a number of departments and agencies in the public sector for certain other departments and agencies in the public sector.

Technical support — All the tasks related to the evaluation, selection and proper operation of the hardware and software made available to all the users.

Processing — All the tasks involved in organizing the elements of data processing, operating computers, manipulating information media and authorizing the output to be given to customers.

Gouvernement du Québec
Ministère des Communications
Direction générale des technologies
de l'information